



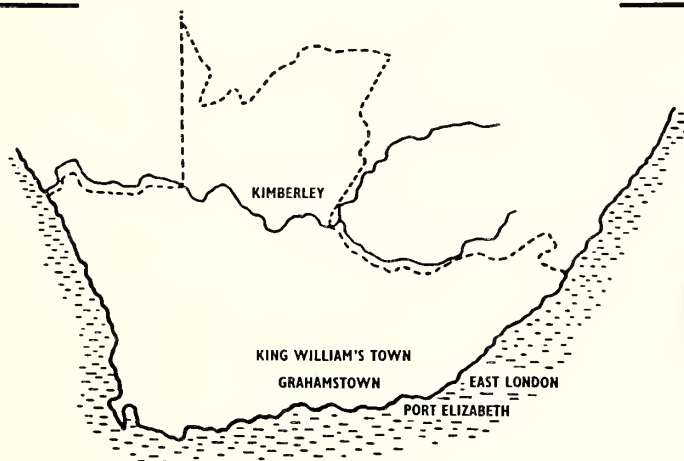


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ANNALS OF THE CAPE PROVINCIAL MUSEUMS

NATURAL HISTORY

Ann. Cape Prov. Mus. (Nat. Hist.)



VOLUME VI • PARTS I—XIII

1966—9

PUBLISHED JOINTLY BY THE
CAPE PROVINCIAL MUSEUMS AT THE ALBANY MUSEUM, GRAHAMSTOWN
SOUTH AFRICA



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South Africa

Albany Museum, Grahamstown

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The Annals of the Cape Provincial Museums are published jointly by the five Cape Provincial Museums situated at East London, Grahamstown, Kimberley, King William's Town and Port Elizabeth respectively. The editorial headquarters are at the Albany Museum, Grahamstown. The journal is intended to record results of research at the museums or on museum collections, in the fields of prehistory ethnology and natural history.

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(c) Symposia:

ALEXANDER, J. 1969. The indirect evidence for domestication. In: UCKO, P. J. and G. W. Dimbleby eds. *The domestication and exploitation of plants and animals*. London: Duckworth, p. 123—9.

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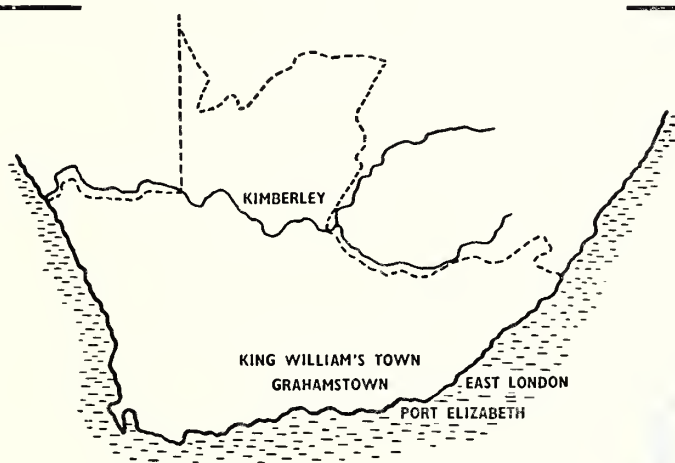
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SOUTH AFRICA

Notes on the place of domestic and indigenous animals in Cape Nguni life

by

E. H. BIGALKE

Ethnologist, East London Museum

The material for this paper is based mainly on some early documentation obtained when the practices described here were still part of daily life, supported and augmented by items in the East London Museum ethnological collection. While the culture of the tribal clusters embraced by the term Cape Nguni is broadly similar and much of the information appearing here can be taken to apply to the whole group, tribal differences will, where possible, be pointed out or cases where a custom is specifically mentioned as being the practice of a particular tribe.

Sustained contact between African and European in the Ciskei and Transkei has long since brought about the wholesale use of western artifacts. It would be difficult to trace the beginnings of this process in this area, for the earliest whites to penetrate so far east of the Colony seldom committed their impressions to paper. Already in the 1820's Kay (1833, p. 31), witnessed one of the regular fairs held at Fort Wiltshire, where the keen demand for European goods was both met and further stimulated. Yet for centuries previously the African had been using the raw material provided by his environment. Flora and fauna were extensively employed to satisfy daily needs; zoological material provided food, clothing, ornaments and utensils. There was a wide range of indigenous animals from which to choose their material but of much greater social and economic importance were the cattle they had brought with them on their southward migration. Inferior though these beasts were, compared with modern, scientifically-bred animals, they were the basis of Nguni social organization as is clearly demonstrated by the many social and ritual practices associated with them. Barrow (1801, p. 177) mentions the absence of horses when he encountered Africans at the Kareeka (Kariega?) River, and Kay (1833, p. 121) remarks that '... horses have but recently been introduced into the country'. Steedman (1835, p. 254) observes that few horses were found among the Mpondo and these belonged exclusively to the chiefs. Similarly, goats appear to have been introduced relatively recently, for Barrow (1801, p. 177) saw none at the Kareeka River, and Kay (1833, p. 121) noted that they were new to the Africans. By mid-century Ciskei Mfengu and Xhosa had large flocks (King, 1855, p. 164). These observations regarding the lack or scarcity of goats are somewhat puzzling in view of the experience of the survivors of the 'Sao Bente' wreck in 1554, who obtained a goat from Africans on the Umzimkulu River (Wilson, 1959, p. 168). Sheep were introduced from the Dutch and Hottentots (Steedman, 1835, p. 354). Steedman also notes on the same page that the Mpondo kept a small breed of fowls 'reared exclusively for the sake of their feathers, which they use to ornament their heads', but the Xhosa seem not to have kept poultry. Dogs were universally kept as hunting animals.

DOMESTIC ANIMALS

Cattle (iinkomo)

In common with other pastoral and semi-pastoral peoples, the Cape Nguni surround the keeping of cattle with a mystique. Cattle are the cornerstone of the social system because they are used for *lobolo*; even today, when it might be impracticable to transfer bridewealth con-

sisting of actual cattle, the value may still be expressed in terms of cattle but made up with other animals, cash or goods. Among those people still motivated by traditional values, a union not sealed by the passage of *lobolo* is not a marriage, nor can children from such a liaison be fully integrated into their proper descent groups. Cattle are extremely important in very many Nguni rituals; to quote just a few—at marriage, death, mourning, rainmaking and in the initiation of diviners (*amagqira*). A new bride, when coming to live at her husband's hamlet (*umzi*), may not partake of the milk from his cattle for the first little while, and usually brings with her one of her father's beasts (*inkomo yobulunga*) to provide sustenance until she becomes an established member of the group. At all the above sacrifices an important portion of the beast is the meat of the right shoulder (*intsonyama*); this is lightly roasted and eaten by the person most closely connected with the sacrifice. For the Mpondo, Hunter (1936, p. 249) notes that the *intsonyama* has no significance except in ritual killings. On the day of a funeral, a beast is killed to cleanse the family of the contamination of death (Hunter, 1936, p. 229); other killings at intervals after the death serve the same purpose. Among the Mpondo cattle are a link with the ancestors and a means of keeping them favourably disposed toward the living (Hunter, 1936, pp. 231, 232, 234). Each *umzi* has an *inkomo yesinyanya* (beast of the ancestors), an animal dedicated to the ancestors 'through which they may be appealed to and their help obtained in sickness or danger' (Hunter, 1936, p. 235). The tail hairs of such cattle are incorporated into necklets to ward off misfortune, Plate I (No. 219/1). The Bhaca also use a black or dun coloured bull in their first fruit ceremony (*ingcube*) (Hammond-Tooke, 1953, p. 84). Soga (N.D., p. 390), mentions two sacred herds among the Bomvana, used for special sacrificial purposes, and notes that this was formerly the practice among the Xhosa. Cook (N.D., pp. 128-9), claims that this was true only of the Gcaleka section of the Xhosa, not the Nqika.

While Barrow (1801, p. 202) speaks of a short-legged, short-necked, generally black and white type of cattle, Hunter (1936, p. 69), maintains that there is a great variety of colour and form and that some of the bulls have humps. She notes that children's clay oxen are always made with humps. Hammond-Tooke (1962, p. 21) speaks of the small scrub variety. In the traditional view, quality was less important than quantity, for a man's stature was to a large extent based on the size of his herd. All matters concerning the welfare of cattle were the exclusive province of males when the tribal system was in full operation. Youths herded them, men sacrificed and treated them, and, more recently, ploughed with them. Women were prohibited from milking cattle or even entering the kraal because they could transmit their ritual impurity (*umlaza*) to the valued beasts; among both Bhaca (Hammond-Tooke, 1962, p. 69) and Mpondo (Hunter, 1936, p. 67) *umlaza* is dangerous also to goats and sheep. Thus boys did the milking and when it was necessary to fetch grain from the grain-pit in the kraal a small child was sent. Small children and old women past childbearing age were free of ritual taint. Nowadays this taboo is often relaxed or abandoned, the latter especially among the School people. Hammond-Tooke recalls a discussion of the taboo with some Bhaca women actually standing in a kraal. Women may also be forced to plough with cattle when their menfolk are away on the mines. *Umlaza* could also be borne by men (Hammond-Tooke, 1962, p. 69), but this does not seem to have been as potent as that of the women; at least, the taboo was not as strictly observed.

Apart from their other aspects, cattle were and are a source of great aesthetic satisfaction to men and boys (Alberti, 1811, p. 105; Hammond-Tooke, 1962, p. 23; Hunter, 1936, p. 70; Lichtenstein, 1812, p. 268). The latter would take great pride in being transferred from caring for small stock to cattle herding. Herdsmen did not always chase their charges from behind; King (1855, p. 168) records that cattle followed the chief herdsman and Lichtenstein (1812, p. 268) writes 'that they are perfectly obedient, and stop or go at the call of their masters, or at the sound of a little pipe, which he sometimes blows'.

Men, especially, would sit in the shade of the kraal fence and discuss the appearance, pedigree, fertility and history of their cattle. Animals are named and the language reflects the interest in cattle for, among the Mpondo, there are at least fifty-seven terms for describing the colours and markings of beasts, and five for the horns (Hunter, 1936, p. 70). Soga (N.D., pp. 387-88) notes among the Xhosa twenty-five names of such colour combinations, and seven for the horns. Alberti (1811, pp. 106-7) and Lichtenstein (1812, p. 268) describe how the Xhosa used to decorate the horns of their cattle by twisting them into different shapes, and also cutting strips of skin away from the necks of calves in order to create pendant ornaments hanging down to knee level. This aesthetic appreciation, on a lesser scale, is extended to goats and horses. Not least among the uses of cattle was for racing (Alberti, 1811, pp. 108-9; Cook, N.D., p. 120; Hammond-Tooke, 1962, p. 23; Hunter, 1936, p. 68). Racing oxen were prized possessions, appreciated for their speed and freshness in a race among the Bhaca, Bomvana, Mpondo and Xhosa. In the absence of horses, they were also used as beasts of burden (Alberti, 1811, p. 109) and as a mode of transport. Barrow (1801, p. 193) describes the arrival of the chief, Ngqika (*anglice* Gaika), who 'made his arrival riding on an ox in full gallop'.

The utilitarian purposes served by cattle were even more varied than those already mentioned. The method of slaughtering the sacrificial beast was decidedly unpleasant; it would be thrown on its side, the legs tied, an assegai cut made in the chest, after which a man would insert his arm through the wound and find the aorta, which was then ruptured or severed (Cook, N.D., pp. 113-14; Hunter, 1936, p. 243; Lichtenstein, 1812, p. 268; Steedman, 1835, p. 15). Little if any of the meat of such animals was devoted to the spirits (*amathonga*); it was consumed by the kin and friends assembled for the occasion and often divided systematically (Cook, N.D., p. 114; Hunter, 1936, p. 243; Maclean, 1866, p. 81; Soga, N.D., pp. 147, 231). Certain portions were avoided by certain classes of people. Girls did not eat kidneys or the rectum of animals because 'they would not reach maturity, besides which should they have children these would have no hair on their heads'; nor would girls eat marrow otherwise their children would have running noses. Boys would not eat the tails of slaughtered cattle 'for it is said that when they take the dowry cattle to the bride's home those cattle will refuse to be driven and will run away' (Soga, N.D., pp. 354-57). The newly married Bhaca woman may not eat the liver, stomach, tongue, head, udder and intestines of cattle, nor pork, nor chicken (Hammond-Tooke, 1962, p. 117). Lichtenstein (1812, p. 272), and Maclean (1866, p. 151), mention more Xhosa meat avoidances. The gall of slaughtered beasts, being associated with the ancestors, was often rubbed over a person for whom the sacrifice was made, or would be drunk or poured over food to add flavour. Inflated gall bladders were also worn by those involved in the sacrifice (Hammond-Tooke, 1962, p. 25; Hunter, 1936, p. 250; Kay, 1833, p. 126). Animal fat was and still is used to condition the skin and butterfat used to smear the body of the newly circumcised young man when he has washed off the white clay. Only wealthy men would kill cattle exclusively to satisfy meat hunger; other people had to wait for the sacrifices, held mainly in winter when the crops had been harvested and life assumed a more leisurely pace. Calves were not killed because it was uneconomical. Kay (1833, p. 124) notes that veal was not eaten, but economy was perhaps not so strong a consideration with chiefs, for Barrow (1801, p. 175) describes three of them wearing long cloaks of calves skins.

Before European trade goods were widely available, hides provided clothing. These were stretched out, pegged, scraped to remove all adhering tissue and fat and then dried, when they were beaten with stones until as supple as cloth. The inside was scraped with a sharp instrument such as the prickly edge of an aloe leaf to raise a nap and then smeared with grease and ochre (Alberti, 1811, p. 51; Barrow, 1801, p. 208; Kay, 1833, pp. 132, 342). Such a skin was worn as a cloak (*ingubo*), with the hair to the inside, or carefully cut to the shape required for a woman's skirt (*isikaka*). This garment was flared, to achieve which shape several gussets were inserted. Skilful cutting and fitting was required, then holes were made with an awl and

the thread pushed through the holes and overstitched. The thread employed here, as well as for beadwork, consisted of the fibres from the tendons of the long dorsal muscle of various animals. The fibre having been steeped in hot water to soften it, the appropriate thickness was chosen and the fibre rotated against the thigh to form a thread (Alberti, 1811, p. 58; Lichtenstein, 1812, p. 273). Karosses were also made of cowhide.

Hardly any of the 19th or early 20th century writers on the area under consideration failed to mention the scantiness of African dress. Soga (N.D., pp. 410-13) describes it in some detail. For men the two most usual articles of dress were the hide cloak (*ingubo*) or a kaross (*isidwaba*), and the penis sheath (*isidla*); wearing the latter, a man was considered decently clad. For special occasions both sexes used a kaross of small wild animal skins (*umnweba*), with the hair worn outside. The *isidabane* was an antelope skin fastening round the neck and hanging over the shoulders in peacetime but worn as a loin-cloth in war. Sandals (*imbadada*, *izihlangu*) were worn by both sexes, especially on journeys or in warfare. For women, the leather skirt (*isikaka*) has already been noted. Beneath this was worn the *inciyo*, a very short apron covering the genitals. It included leather flaps, or merely a leather band with a fringe of vegetable fibre. The *igqesha* was a girdle of leather, together with metal and/or beads, worn round the waist. The *incebeta*, worn by married women, was a breast covering of leather (King, 1855, p. 169). To the *umnweba* (kaross) was attached a kind of cape (*isibaca*), made of strips of hide sewn together and ornamented with brass buttons. Children's clothing was similar, although small boys went naked in warm weather, using a cloak or kaross against the cold. They started wearing the *isidla* about the beginning of puberty. Girls always wore an *inciyo* and when necessary the *umbaco* (skirt) and *ixagatu* (cloak). As already mentioned, much of this apparel was made of cowhide; variations and differences will be described below.

These tailoring activities were performed in winter, when agricultural work was at a minimum. These garments were used until Kaffir sheeting and blankets from the traders replaced cowhide. By 1851-52 (King, 1855, p. 169) 'a coarse blanket' was worn by Xhosa commoners. Nowadays *izikaka* (hide skirts) may still be worn on very special tribal occasions in conservative areas, and even in towns; for example, traditional dress is quite widely worn by urban Mfengu on their National Day, 14th May.

Sandals were also manufactured from cowhide. Kay (1833, p. 112) writes of sandals being used for travelling, 'consisting of stiff pieces of hide, roughly shaped to the foot, and fixed by means of two or three short thongs, that pass over the instep.'

Hide was used for milk sacks, the binding of spears, making thongs and shields. Kay (1833, p. 65) describes their manufacture from stiff, dried hide by young warriors at Chief Pato's homestead. They were 'sufficiently large to cover the whole body, in time of danger', i.e. roughly four feet by two, and oval in shape. For reinforcing, a wooden staff was inserted into a double row of slits, and long strips of green hide threaded through them. Steedman (1835, p. 58) found that Chief Botoman kept his warriors' weapons in an armoury near his own and distributed them when necessary.

The Cape Nguni do not appear to have had specially made drums, such as those found in other parts of Africa. They used a whole dried hide which was either secured a few feet above the ground by means of poles or was held up by the performers. On some occasions a bullock would be specially slaughtered to provide this hide (*ingqongqo*) (Kirby, 1934, p. 21). Alternatively a shield (*inkavu*) was beaten (*op. cit.*, p. 22). The dried hide as a drum played an important part in the initiation and subsequent practice of the diviner, being used when he was about to 'smell out' an evildoer (*op. cit.*, p. 22). Maclean notes an identical usage for the Thembu. The Bhaca still use a rolled up cowhide in the diviner's seance (*intlombe*) (Hammond-Tooke, 1962, p. 252). The present writer recently saw an interesting modification of the cowhide drum—a sheet of corrugated iron 'played' by pagan Xhosa farm women at an *ikrwala's* (newly initiated young man) coming out ceremony.

Horn was used for the manufacture of snuffspoons Plate II (No. 220/34) and as a mouth-piece or filter to which the bowl of a dagga pipe was secured. Kirby (1934, p. 79) describes an oxhorn trumpet (*butyu*) among the Bomvana; 'it yields only one note and is used during the boys' initiation ceremonies'. The Xhosa also used an oxhorn (*isigodhlo*) (*op. cit.*, p. 79) which 'summoned the people to the chief's private enclosure'. Nowadays it is used by children at play. Cook (N.D., p. 26) notes that the horns of sacrificial animals were placed on top of huts. Tails were used as flyswitches and tail hair went into *ubuhunga* necklets for protection, as noted above. Kay (1833, p. 117) describes men wearing cows' tail brushes as leg ornaments. The horny hoof coverings were sometimes used by diviners but these and bones, especially from sacrificial animals, were usually buried. Bone snuffspoons and combs were, however, manufactured. One of the most ingenious uses for the by-products of slaughtered animals was in the making of snuffboxes of the scrapings from hides, mixed with clay. This substance was fashioned into gourd or cattle-shapes, the surfaces being indented with a small stick to produce a rough-cast appearance Plate III (No. 219/23). Miss Courtenay-Latimer (*pers. comm.*) reports that an older method of snuffbox manufacture was by mixing sinew, chewed by women, with clay.

Goats (iibokhwe) and Sheep (iigusha)

Because of their more recent introduction than cattle, these kinds of animal, especially sheep, are less fully integrated into the Nguni way of life. This is noticeable especially in the sphere of ritual, for sheep are not used in the most important sacrifices, those to the ancestors. One reason given is that they do not bleat or bellow when stabbed, as a goat or beast will do. The goat is used in sacrifices, often as an earnest of a bigger animal when the person concerned is better able to afford it.

Nevertheless, a goat or sheep was killed for the *imbeleko* ceremony at the coming out of a mother and baby and the skin prepared for use as a blanket in which to carry the baby on its mother's back. This was not an occasion for calling on the ancestors but the Mpondo believed that if the killing was omitted the child might get sick (Hunter, 1936, p. 155). Bhaca believe that the baby will refuse to suckle if there is no *imbeleko* killing (Hammond-Tooke, 1962, p. 75). Christian Mpondo no longer observe the *imbeleko* custom but have replaced it with 'a baptismal ceremony in church and a feast, *idinala yokuphelelela* (dinner of baptism), for which a sheep or goat is usually killed' (Hunter, 1936, p. 158). Hammond-Tooke (1958, p. 19) reports that a goat is killed while a Bhaca girl is in seclusion after her first menstruation; she is given a special portion of meat from the right foreleg (Xhosa: *intsonyama*; Bhaca: *imbetfu*), a part used in many ritual killings, and is also given gall to drink. This is a feature of many ceremonies because gall and gall bladders are associated with the ancestors (Hammond-Tooke, 1955, p. 17). Another goat is killed after the girl 'comes out', in order to lift the taboo on the drinking of milk. For the ceremonial purification of a widow, about a year after her husband's death, a goat is killed in the kraal of the dead man's *umzi* 'and the widow "washes" her hands by dipping them in the contents of the stomach of the animal killed. "It is done that the widow will not suffer from the death of her husband"' (Hunter, 1936, p. 229). The intestinal fat of the goat plays an important part in Bhaca protective magie, being used in the form of a rope in the initiation of a diviner, also for the mother of newly born twins (Hammond-Tooke, 1955, p. 20). Small stock also plays a part in the ritual surrounding agriculture. Pagan Mpondo perform a ceremony to bless a new plough (Hunter, 1936, p. 79). They kill a goat and pour the gall over the plough; they also tie the gall bladder and a strip of skin to the top of the plough share. The Bhaca used to perform this plough-blessing ceremony (Hammond-Tooke, 1962, p. 269). Hunter (*op. cit.*, p. 77) also reports that the horn of a black sheep is sometimes dug into the soil of a garden to promote its fertility. A white goat is sacrificed in the early stages

of a diviner's initiation and such a practitioner will also often wear the inflated gall bladders of goats as part of the headdress. A herbalist (*ixhwele*) may demand a goat before he begins treating an *umzi* against lightning or sorcery (*op. cit.*, p. 342). This animal is called 'the stick to dig the medicines'.

Goat- and sheepskins are used for clothing and accessories, even nowadays by Bhaca women. Apart from the baby's blanket already mentioned, goatskins are made into beaded bags in which young men carry their pipes and other belongings. Such a bag is often made from the whole skin, with the hair inside and the outer surface ochred Plate IV (No. 219/22). Angora goatskin with the hair attached is used by Mfengu youths as leggings for dancing regalia. Kirby (1934, p. 8) was informed that the Xhosa had ankle rattles (*amanqashele*) of goatskin but did not see any specimens. Bhaca women at the first fruits ceremony have 'large leather rattles filled with pebbles tied to their ankles' (Hammond-Tooke, 1962, p. 184). Among some of the Cape Nguni the youths in seclusion (*abakwetha*) during the initiation period kept themselves warm with white sheepskin blankets, the wool worn next to the skin. Traditionally, circumcision occurred during the autumn, after which the youths spent three months or more in seclusion, that is, well into winter. They also wore chaplets of the same material. Nowadays white blankets have replaced the traditional ones.

Horses (amahashe)

We have noted that horses have been kept by the Cape Nguni for not more than a century and a half at most, and even less than small stock are they integrated into ritual although they may now be included as *lobolo* animals; one horse equals one head of cattle (Hammond-Tooke, 1962, p. 162). Hunter (1936, p. 67) does mention that horses are treated so that they may be swift. At a time soon after their introduction to the Xhosa, Kay (1833, p. 121) remarked, 'Many of the young Chiefs are becoming real Bedouins in their fondness for these animals; and some of them now possess very fine studs, which they are annually increasing'. Lichtensetin (1812, p. 31) describes a meeting between General Janssens and Ngqika, the latter on horseback.

Other small stock

Apart from Steedman's reference to the special breed of small fowls kept for their decorative feathers, none of the available sources give any clue as to the origin of poultry-keeping among the Cape Nguni. Kay (1833, p. 125) specifically mentions the absence of poultry. Certainly, fowls were not an important source of food and their eggs were avoided, especially by the women, as being conducive to lasciviousness (Kay, 1833, p. 125; Schapera, 1953, p. 133; Soga, N.D., p. 354). Nowadays poultry is eaten by many Cape Nguni. Among the Bhaca a white fowl will be used during the initiation of a diviner (*isangoma*) (Hammond-Tooke, 1955, p. 18). Similarly, the origin of pig-keeping among these people is unknown. They were probably introduced by the white man. Linguistic evidence would seem to support this surmise, for *ingulube* is the word used for wild pig, while *ihagu* (domestic pig) is derived from the English word 'hog'. Kay (1833, p. 124) did not find any being kept and says that the meat would never be eaten, although 'there is indeed a species of wild hog to which [the Xhosa] has no objection'.

In recent times pigs have been used by the Mpondo. Hunter (1936, p. 167) mentions the killing of a pig as part of the girls' initiation ceremonies, and on another occasion a pig was killed when an *umzi* was being treated after having been struck by lightning (*op. cit.*, p. 298). The fat was mixed with medicines which were smeared on wooden pegs. This observance is reported also for the Bhaca (Hammond-Tooke, 1962, p. 272), who will also kill a pig to provide meat for an agricultural working party (*op. cit.*, p. 144).

INDIGENOUS ANIMALS

From the descriptions of early travellers it is clear that big and small game abounded in the Ciskei and Transkei, and it must have been hunted by the Africans of these areas since their arrival there. Steedman found elephants being hunted near Mount Coke Mission in 1826, and himself went on an elephant hunt in this region. The hippopotamus frequented many of the rivers of the area while the rhinoceros was found in bushy country. Leopard, hyena and jackal occasionally occur even today, and they must have been numerous in former times, as also lions and antelopes. Bird life was prolific. Naturally, the incidence of indigenous wild life depends on the availability of its natural habitat, and with the settlement of part of the area by white farmers, and the eradication of bush, much of this life moved away or was exterminated. Yet today, with the limited hunting seasons and a deliberate conservation policy practised by some farmers, it is safe to say that more game exists on farms than in the African reserves and locations in the Ciskei and Transkei. Indeed, except for the hardiest and fleetest species of mammals and birds, it would be difficult to find any in the African areas. The reasons are not difficult to find.

Domestic stock increases at a relatively slow rate and, more important, is difficult to acquire by purchase in an economy which is still largely one of subsistence or depends on wages remitted by migrant labourers. The *lobolo* system is still based on cattle, thus they are too important socially to serve as food, except when slaughtered for legitimate sacrifices. Yet meat hunger is great and wild game is the obvious means of stilling it. Indeed, hunting was formerly an important socio-economic activity, providing not only material spoils but also the prestige of good marksmanship, especially for the young men undergoing initiation (*abakwetha*). Communal drives were held, the men being armed with knobbed sticks (some of these were of rhinoceros horn), the dogs in front of the line of men to flush and catch animals which were then clubbed. Such drives still sometimes occur though nowadays the bag is seldom spectacular—a few birds—and the hunters mainly small boys. An alternative method of obtaining game was by trapping it in pits, with sharpened stakes at the bottom, and covered over with vegetation (Alberti, 1811, p. 154); Lichtenstein 1812, p. 269). Already in 1835 game was scarce in Pondoland; Steedman (1835, p. 258) notes that although no private rights to hunting grounds were recognised, influential men claimed the right to hunt in certain forests and allowed others to do so only with permission. It is heartening to learn from Hammond-Tooke (1962, p. 25) that the enlightened Chief Wabana among the Bhaca has prohibited the use of guns on communal hunts and has restricted hunts to every second year so that the game will have a chance to increase. While they still occurred in the Ciskei-Transkei areas, certain species of animals and birds enjoyed a measure of protection because they were the subject of supernatural observances or hunting taboos. These will be mentioned below. Marginal to these species was the elephant, the carcass of which the Africans would refuse to butcher because they feared the consequences (Kay, 1833, p. 138); nor would they eat the flesh, which was left to rot or be eaten by animal scavengers. Kay (*op. cit.*, p. 125) was informed that 'The sagacity of the elephant renders him too much like man, to allow of his being made the food of man'.

Although slaughtered elephants were left to rot, they provided coveted trophies. Steedman (1835, p. 24), related that the first man to wound the beast 'received the honour and benefit of its death'; he kept one tusk only, the other being the chief's prerogative. From the tusks were manufactured the ivory armrings worn by chiefs and influential men (Alberti, 1811, p. 58; Barrow, 1801, p. 175; Lichtenstein, 1812, pp. 274, 307; Rose, 1829, p. 80; Steedman, 1835, p. 72). Sections were cut from the thickest part, hollowed and smoothed off. Ngqika was observed wearing five large ivory armrings (Steedman, 1835, p. 72). So prized were these ornaments, indeed, that a man would seldom part with one and if it broke it would be repaired

with metal pegs or the melted lead from bullets. Among those in this museum is one taken from the arm of Sandile on his death in 1878 Plate V (No. 220/37). These armrings were worn above the left elbow and in some cases the constriction caused their wearers considerable pain and inflammation (Alberti, 1811, p. 174). The tuft of hair at the end of an elephant's tail was cut off and taken to the chief, who fixed it to a stick at the entrance to his cattle kraal, where it hung 'as one of the ensigns of royalty' (Kay, 1833, p. 138; also, Alberti, 1811, p. 157; Rose, 1829, p. 79).

Leopards were frequently hunted for their skins which were the perquisite of the chief (Alberti, 1811, pp. 51, 173; Hunter, 1936, p. 95; King, 1855, p. 169; Rose, 1829, pp. 87, 133, 184), as were the horns of rhinoceros and the tusks of hippopotamus. Leopard skins have traditionally been worn by Cape Nguni chiefs; three early writers (Barrow, 1801, p. 199; Kay, 1833, p. 42; Steedman, 1835, p. 31) describe Ngqika wearing such a cloak. Today they are still employed in the installation ceremonies of government-appointed chiefs. Among the Bomvana (Cook, N.D., p. 147) and Xhosa (Lichtenstein, 1812, pp. 277, 288) chiefs' messengers were known as *imisisila*—those of the tails—because they wore leopard tails or carried them as badges of office. 'The tail of a lion or a panther' (*op. cit.*, p. 288) is reported by Lichtenstein as being used to distinguish the king's residence.

All kinds of antelope found in these areas were hunted for sport, meat and their skins. These were tanned and made into capes or cloaks (Soga, N.D., pp. 410–11) and caps; for the latter the skin of the blue duiker—*iphuthi* (*Gueveia caerulea*) was considered especially suitable. Steedman (1835, p. 71) saw Ngqika's wife wearing such a cap. Oribi—*iula* (*Ourebia ourebi*) skin was, according to Brownlee (1896, p. 263) usually worn as a girdle by Xhosa brides, although Sandile's daughter wore a cloak out of deference to the Europeans present. The bags used by eligible young men and women are made of bushbuck skin—*imbabala* (*Tragelaphus scriptus sylvanus*), the hair side outside. Soft skin of the smaller antelopes, such as grysbok—*ingxungxu* (*Nototragus melanotis*) and duiker—*impunzi* (*Sylvicapra grimmia*) was used for this purpose and also fashioned into penis sheaths (*izidla*) for youths and men. Frequently skin from the leg was used, with hair for youths, without for men, and tassels of skin might be left hanging from the end. All varieties of antelope horns were used by diviners and herbalists and by their patients as medicine containers. Lichtenstein (1812, p. 273) mentions Xhosa men wearing a head ornament consisting of 'zebra's or Jackall's hair'.

Of other animals used, skins of the smaller felines, such as the spotted genet—*inyhuagi* (*Genetta genetta*) and the Cape wild cat—*ingada* (*Felis lybica*) were used, either whole or cut up, for bags and penis sheaths. Otter skin—*intini* (*Aonyx capensis*) formed the headdress of a diviner seen by Kay (1833, p. 294). The burning of the skin of the antbear—*ihodi* (*Orycteropus afer*) is described by Soga (N.D., p. 395) as a specific for promoting fertile fields. Short lengths of porcupine quill—*incanda* (*Hystrix africae-australis*) together with snake vertebrae, appear in charm necklets Plate VI (No. 219/43). Quills were used by the Xhosa as warriors' head ornaments (Steedman, 1835, p. 58) and as ear ornaments (King, 1855, p. 170). Necklets for special occasions are made of the teeth of baboons—*imfene* (*Papio ursinus*), the smaller cats, and hyraxes—*imbila* (*Procavia capensis*). We have in the Museum one of small, wild pig teeth, which appears to be relatively old although the animal still exists in this area. The vervet monkey—*inkawu* (*Ceropithecus aethiops*) provides skin, cut into strips and twisted, for the kilts worn by male diviners, as also for their mitre-like hats. Skin headdresses, ornamental brushes for young men's heads, and hair necklets are made from the pelt of the Maanhaar jackal—*inchi* (*Proteles cristatus*). Diviners and *abakwetha* use the fur of the red hare—*intenetya* (*Pronolagus* sp.) in headdresses.

Apart from the vertebrae of snakes in necklets, the only other reptile utilised is the tortoise. Its carapace was used by women as a container for medicines and cosmetic substances (Alberti, 1811, p. 55; Barrow, 1801, p. 176; Hunter, 1936, p. 285; Kay, 1833, p. 115). Hunter

(*op. cit.*, p. 67) records an isolated case in Pondoland of burning a tortoise in the cattle kraal as a means of promoting the increase of the herd.

We noted above that certain species of birds enjoyed protection by virtue of their being the subjects of supernatural observances or hunting taboos. Such were the ground hornbill—*intsikizi* (*Bucorvus leadbeateri*), the crowned crane—*ihem* (*Balearica regulorum*), the wagtail—*umcelu* (*Motacilla* sp.) and the 'common kite' (probably black-shouldered kite—*ikhozi* (*Elanus caeruleus*) (Soga, N.D., p. 201). The penalty for killing one of the first two was the sacrifice of a calf or a young ox (Kay, 1833, pp. 204–5; Steedman, 1835, p. 236). Formerly the Mpondo (Hunter, 1936, p. 83) and the Xhosa (Soga, N.D., p. 198) used the hornbill for rain-making, the dead bird being tied in a river; the rain which was expected to ensue would not stop until the *intsikizi* was washed away or removed. No penalties attached to killing a blue crane—*indwe* (*Tetrapteryx paradisea*), the entire wings being used by Xhosa warriors of Kay's time as head ornaments (Kay, 1833, p. 66). The long wing feathers were worn on the heads of chiefs, whose prerogatives they were (Lichtenstein, 1812, p. 287). This Museum has a young man's head ornament of kori bustard (*Ardeotis kori*) feathers; youths undergoing initiation employ a variety of feathers in their headdresses. Among present-day Bhaca (Hammond-Tooke, 1962, p. 82) married women wear dyed ostrich plumes at the first fruits ceremony, though these are purchased from traders. Alberti (1811, p. 173) notes that ostrich feathers belonged to the chief.

A few other aspects of the significance of animal life to the Cape Nguni remain to be noted. In common with a great many African peoples, those of the Cape Nguni group have a folklore rich in tales of animals, birds and reptiles. Their speech also abounds in references to them, especially in the sphere of proverb and metaphor. Finally, animals play a prominent part in the whole complex of witchcraft belief and practice. It would be out of place to provide a detailed account of this complex; suffice it then to say that the word 'witchdoctor' is a misnomer. Nguni have two main types of 'doctor', the diviner (*igqira*) and the herbalist (*ixhwele*). The former acts as the interpreter of misfortune and intermediary with the ancestors. Tendencies towards this role are recognised when an individual has a prolonged or persistent illness, an *inkathazo* (trouble). In this condition he or she has dreams and visions of an *ityala* (Mpondo), *ithongo* (Xhosa) (ancestor in the form of an animal), a lion, leopard, elephant or any other wild animal. Among the Mpondo the form of an *ityala* depends on the individual concerned, it has no connection with the clan of the novice or, if a woman, of her husband. An East London Mfengu informant, herself both diviner and herbalist, claims that the novice dreams of two animals, one on the paternal side, one on the maternal. It is the nature of the animals which determines the kinds of skins worn by diviners; thus the picturesque figure cut by the diviner in full regalia, wearing perhaps a kilt of vervet monkey skin strips, or baboon or genet; a cape of antelope skin or cowhide, and in the case of most male diviners, a cap of *maanhaar* jackal skin. Ordinary people who have been ill or suffered misfortune and consulted a diviner may also wear the skin or hair of the diviner's *ityala*.

Fabulous animals play a part in beliefs about the supernatural. Witches and sorcerers—those who deliberately harm others—are thought to have such familiars. Such are the baboon (*imfene*), a mythical cat (*impaka*), and the iguana (*uxam*). A female witch often possesses the lightning bird (*izulu* or *impundulu*). It is a bird which lives where the lightning strikes, and appears to those who possess it as a handsome young man. This and other familiars are employed to cause sickness and death; a familiar may cause a pregnant woman a difficult delivery. Another familiar is the snake of women (*inyoka yabafazi*). Somewhat similar to these, but more substantial, are those animals whose appearance is considered to be an ill omen sent by a witch. Such are the ground hornbill, the hammerhead—*uthekwane* (*Scopus umbretta*), the jackal buzzard—*ingqanga* (*Buteo rufofuscus*) and the hyrax, among the Mpondo (Hunter, 1936, p. 288). For the Xhosa, Soga (N.D., pp. 198–201) mentions the owl, the horned owl and

the war eagle. When they appear in an *umzi*, or the birds settle on a roof, it is a portent of evil, especially a warning that lightning will strike there, and the *umzi* must be treated to avoid the misfortune.

While a considerable proportion of the Cape Nguni have become increasingly urbanized and westernized, many of them, especially rural people and those who have recently moved to town, have not completely discarded the customs and practices described above. Domestic and indigenous animals, where the latter are still to be found, continue to play an important part in social, economic and ritual life. Traditional rituals are still sometimes practiced even in the urban areas, in spite of municipal regulations, or on the outskirts of a municipal area. People kill ostensibly for the meat but the occasion may still be a surreptitious sacrifice to the ancestors. Strips of the animal's hide may be worn as amulets. Similarly, visits to the diviner and herbalist are not confined to pagans and an urban African may be observed wearing a protective amulet or necklet prescribed by this practitioner. Such manifestations of traditional belief are not unexpected in an area so long isolated from the mainstream of western contact and still in places a stronghold of conservatism.

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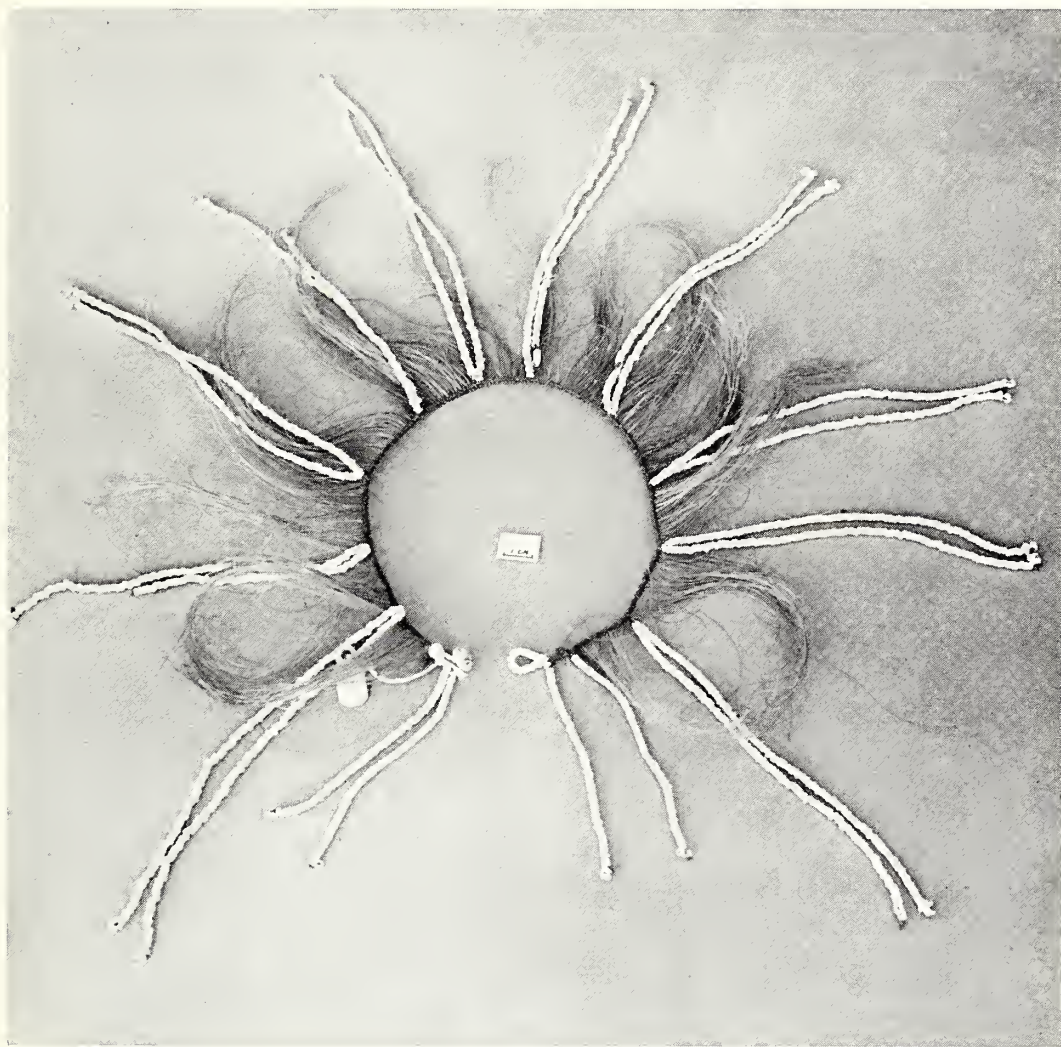


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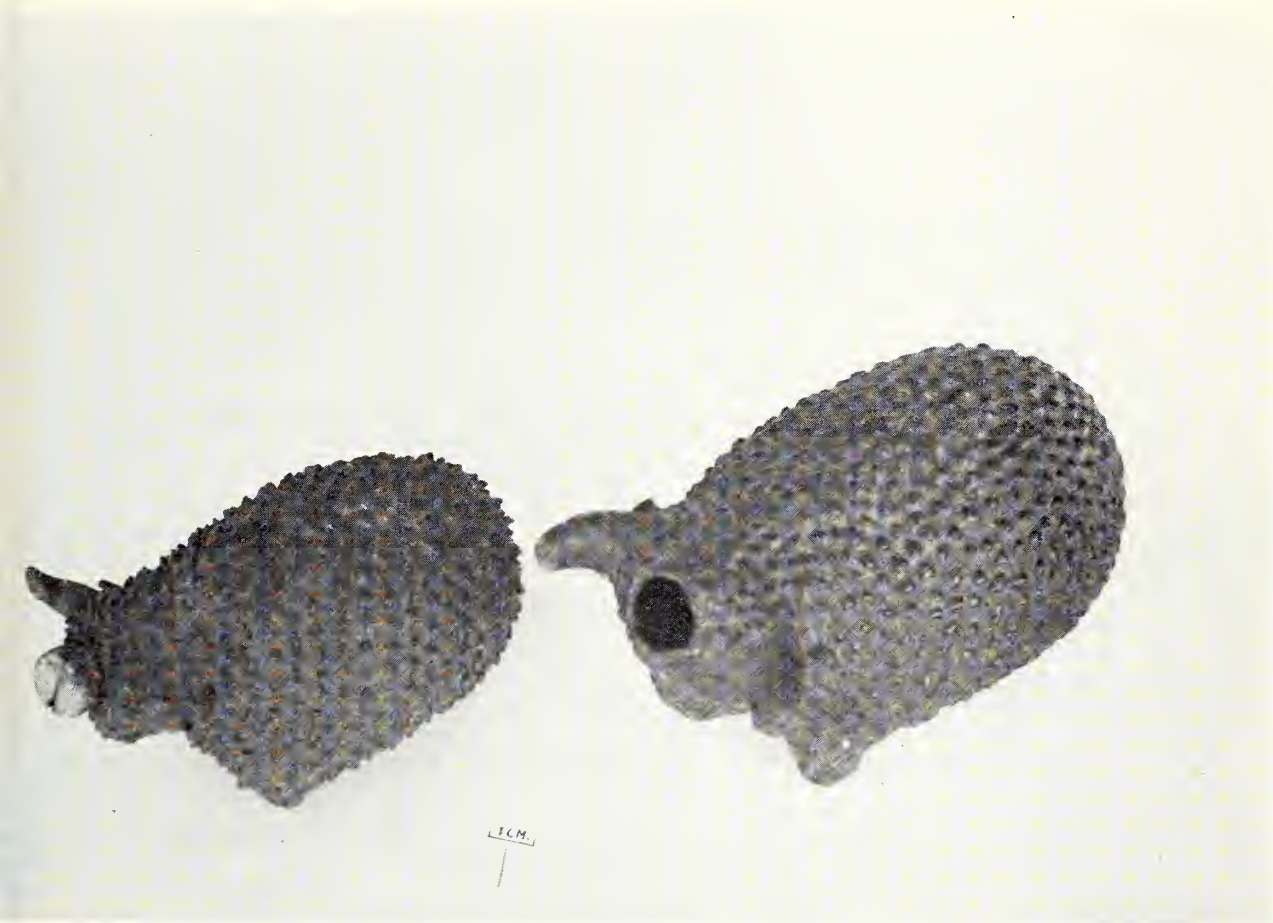


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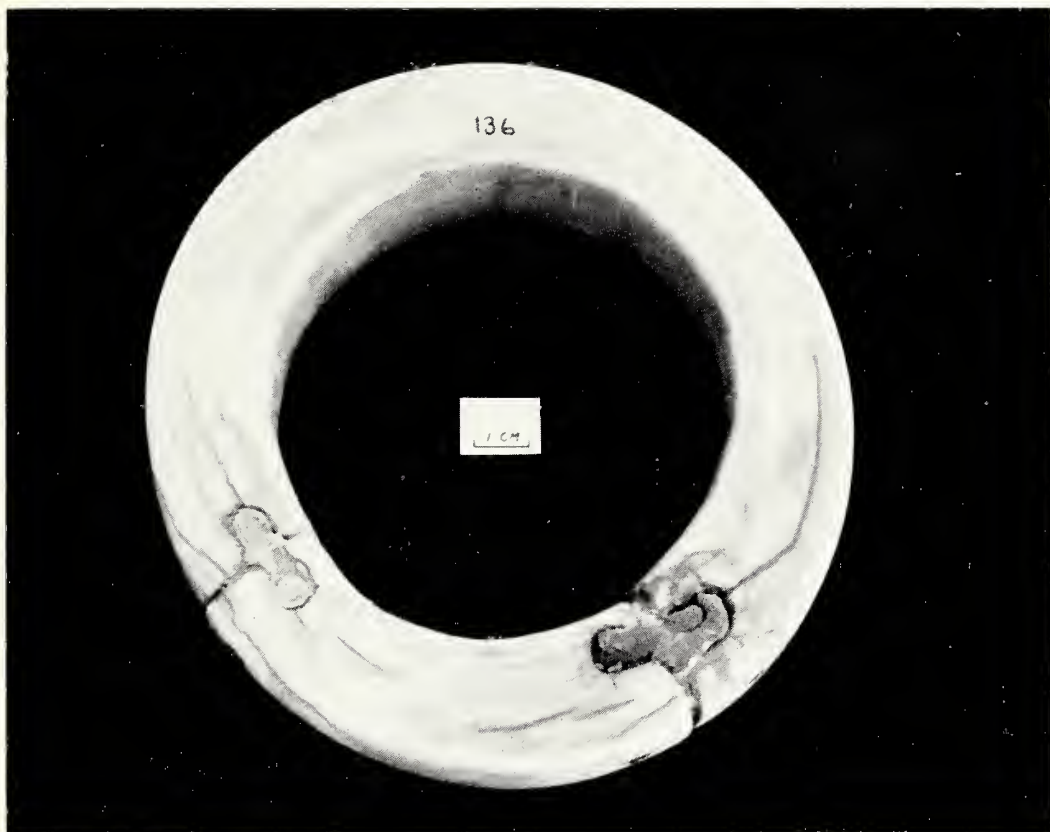


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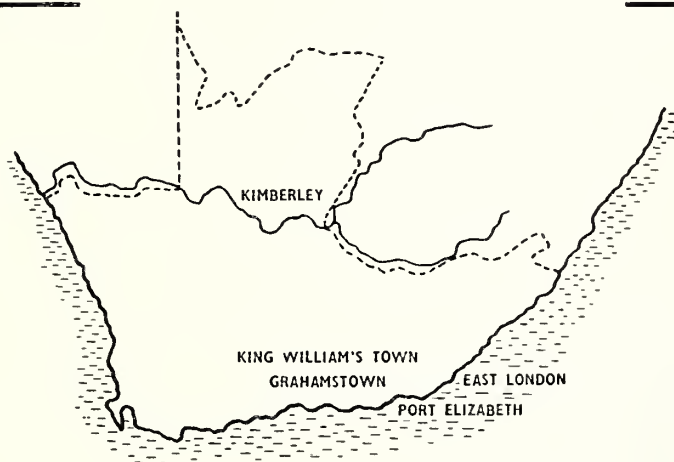
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The generic identity of *Labeo quathlambae* Barnard (Pisces, Cyprinidae)

by

P. H. GREENWOOD (British Museum [Natural History])

and

R. A. JUBB (Albany Museum, Grahamstown)

INTRODUCTION

In 1938, K. H. Barnard described, as *Labeo quathlambae*, a new and unusual species of cyprinid fish from a high altitude stream on the Drakensberg Mountains of Natal. It is clear from the original description that Barnard was uncertain about the generic identity of his new species, which seemed to combine characteristics of both *Labeo* and *Barbus*. His decision to include the species in the genus *Labeo* was based largely on its possessing very small scales (thus, in Barnard's opinion relating it to *Labeo umbratus* [A. Smith] and *L. steiningi* G. and T.), and the presence of tubercles on the head in specimens of both sexes.

Recently, the junior author re-examined the type series, and concluded that the taxon *quathlambae* could not be included in the genus *Labeo* for several reasons. Some of the distinguishing characters he noted are the short gut (less than body length), the biserial pharyngeal dentition, and the unspecialized nature of the mouth and lips. After preliminary discussions between us on possible generic relationships, a few specimens were sent to the senior author who undertook to make a detailed osteological study of the species as part of our attempt to ascertain its relationships.

"*Labeo*" *quathlambae* is of considerable interest on several counts. Not only does it differ from all other African Cyprinidae (and resemble certain Eurasian and American cyprinids), but it is probably extinct. Even in 1938 there were strong indications that the population was declining in number. The first specimens sent to Dr. Barnard, taken from the Umkomazana River (altitude *ca* 5,000 feet), a tributary of the Umkomaas, were collected by the then acting Superintendent of Trout Hatcheries who reported that the species used to be common until the introduction of trout, *Salmo trutta*, some years previously; after that time it had become almost extinct. At Dr. Barnard's suggestion a further search for specimens was made, and produced only one additional fish from the same locality; however, later over fifty specimens were caught. Since 1938 no other specimens have ever been collected, despite deliberate attempts to do so in the type locality and other similar streams.

TAXONOMY

Because, at least superficially, "*Labeo*" *quathlambae* resembles certain species of *Labeo*, and is even more like some *Barbus* species, a detailed comparison was first made with these two genera. Some of the major differences are discussed below.

"*Labeo*" *quathlambae* differs from African and Asian species of *Labeo* in the following characters:

- (i) Lips not markedly thickened, and not forming a sucker-like disc around the mouth; upper lip not overhung by the frenum, from which it is separated by a distinct groove.

- (ii) Dorsal fin origin slightly behind the vertical through the insertion of the pelvic fins (in *Labeo*, the dorsal fin origin is always clearly in advance of the pelvics).
- (iii) No enlarged pelvic axillary scale developed; chest scaleless.
- (iv) Pharyngeal teeth in two rows only, and of a very characteristic shape. In *Labeo*, the pharyngeal teeth have crowns which are expansive (in relation to the slender necks) but laterally compressed and obliquely truncated so as to present an almost flat occlusal surface, with little space between the individual teeth of the three rows. In contrast, the teeth of "*L.*" *quathlambae* have strongly recurved crowns with expanded and concave (i.e. spoon-shaped) occlusal surfaces terminating in prominent, conical, curved and posteriorly directed tips; the teeth are widely spaced, and the crowns do not present a pavement-like occlusal surface (see figs. 13 and 14).
- (v) The dentary has a more prominent and higher coronoid process, and a longer, more gently curved and less massive precoronoid arm than is found in *Labeo* (see figs. 8 and 9). Mandibular shape in *Labeo* is very characteristic, and is not found in any other African cyprinid genus except in a few species currently referred to the disputable genus *Varicorhinus*. Associated with these differences in mandibular shape, the symplectic in "*L.*" *quathlambae* is noticeably longer than in *Labeo* species.
- (vi) There are only four circumorbital bones in "*L.*" *quathlambae* (five in *Labeo*).
- (vii) The gut is shorter than the body (in *Labeo* species, the gut is from 14 to 21 times as long as the standard length [Matthes, 1963]).

In its general facies, "*Labeo*" *quathlambae* is rather more like a species of *Barbus*, but it is nevertheless readily differentiated by these characters:

- (i) No *Barbus* species of the group with radiately striate scales has such small scales, and no species of this or any other group has a naked chest. The latter character should, however, be treated with caution since it may, to a certain extent, be environmentally determined (see Berg, 1949, on a clinal variation in chest squamation shown by populations of the gudgeon *Gobio gobio* in eastern Europe). An enlarged pelvic axillary scale is always present in *Barbus*.
- (ii) The biserial pharyngeal dentition and the shape of the pharyngeal teeth in "*L.*" *quathlambae*. Although tooth form in *Barbus* shows greater variation than in *Labeo*, we have not found the "*L.*" *quathlambae* dental form in any of the several European, Asian or African *Barbus* species we examined, or which have been figured in the literature (see especially, Chu, 1935). Also, in *Barbus* the pharyngeal dentition is more markedly heterodont than in "*L.*" *quathlambae*. In passing, it should be noted that several *Barbus* species have a diet like that of "*L.*" *quathlambae* (i.e. insectivorous).
- (iii) At least in relation to the African *Barbus* species with radiately striate scales, "*L.*" *quathlambae* has a higher vertebral count (39, cf. 29–33 [Daget, 1954, 1962 and 1965, and personal observations]). Vertebral counts as high as those of "*L.*" *quathlambae* are, however, found in some *Barbus* species referable to the group with parallel striae in the scales. By no means all small *Barbus* species have been checked for vertebral numbers, but counts within the range 29–33 are so common in those which have been examined that it seems reasonable to consider these figures as indicative of the modal range.

Most *Barbus* species so far described (see Daget, 1962 and 1965) or examined by us, with respect to the circumorbital bones have five bones in this series; "*L.*" *quathlambae* has four, as do *Barbus cadenati*, *B. apogonostomus* and *B. niokoloensis* alone amongst the described *Barbus* species (Daget, 1962).

From what has been said above, it is clear that the taxon *quathlambae* cannot be included in the genus *Labeo* which, despite its wide geographical distribution and high number of species, is readily and trenchantly definable on the basis of jaw and mouth morphology, and the nature of its pharyngeal dentition. Even the more heterogeneous characteristics of the less readily definable genus *Barbus* do not allow the inclusion of *quathlambae* as a constituent species. Likewise, jaw and mouth structure, the small scales, and the pharyngeal dentition of *quathlambae* effectively exclude the species from any other African cyprinid genus; if anything, *quathlambae* is more closely related to *Labeo* and *Barbus* than to these other genera.

There is, of course, the possibility that "*L.*" *quathlambae* might be an introduced species, a suspicion reinforced by its superficial resemblance to certain North American cyprinids (especially species of *Conesius*). However, the shape of the pharyngeal teeth, the markedly emarginate anterior tip of the cleithrum (see Regan, 1911), and numerous small details of morphology at the "species character" level seem to rule out any such possibility as far as American cyprinids are concerned. Similarly, *quathlambae* cannot be identified with any European or Asian cyprinid genus, and we must conclude that "*Labeo*" *quathlambae* represents a unique, undescribed and endemic African genus.

Oreodaimon gen. nov.



Fig. 1. *Oreodaimon quathlambae*; lateral view. S.L. 83 mm. S.A.M. 19018. Housed in Albany Museum.



Lateral view of head



Ventral view of head

Type species: Labeo quathlambae Barnard, 1938, *Ann. Natal Mus.*, 8 (3): 525–528; one text figure.

Mouth subterminal, crescentic. Lips smooth on their inner aspects, not enlarged and not forming a sucker-like disc around the mouth opening. Lower lip free laterally but fused with underlying tissue medially; upper lip separated from the frenum by a distinct groove. Upper jaw protrusile. A single (posterior) pair of maxillary barbels. Scales small but imbricate, radii present in the basal, lateral and apical fields, the latter radiately arranged; scales absent on the chest (the area between the isthmus and the pectoral fin bases). Dorsal fin origin slightly posterior to the vertical through the insertion of the pelvic fins; no enlarged pelvic axillary scale. Pseudobranchiae present. Pharyngeal bones with two rows of teeth (3, 4–4, 3), the teeth with strongly curved, broad and concave crowns which terminate in prominent, conical and recurved tips. Dentary with a prominent coronoid process, and a long, slender precoronoid arm. Weberian apparatus complete, the second and third vertebral centra fused, the first centrum not anteroposteriorly compressed. Cleithrum with deeply emarginate anterior tip. Vertebrae (including the four incorporated in the Weberian apparatus, and the ural centrum) $20 + 19$ in the two specimens examined. Swimbladder large (extending throughout the abdominal cavity), transversely constricted, the posterior part about $1\frac{1}{2}$ times as long as the anterior portion. Gut short, about 0.7 times standard length.

The name *Oreodaimon* is derived from the Greek ὄρεο—a mountain, and δαίμων—a spirit, in allusion to the species' habitat and its probable extinction.

Oreodaimon quathlambae (Barnard), comb. nov.

OSTEOLOGY

In order to compare *O. quathlambae* with other cyprinid genera, and also in an attempt to assess its probable subfamilial relationships, certain osteological characters were studied. In many respects it is still too early to make full taxonomic use of osteological characters within the Cyprinidae because so few species have been studied from this point of view. Thus, it seemed worthwhile to give at least a brief description of skeletal features in *O. quathlambae*, if only to provide some data for another cyprinid genus and species. Two small specimens (ca. 40 mm. S.L.) were cleared and stained with alizarin; the figures and descriptions are based mainly on these specimens. The pharyngeal bones and certain other features were also examined, by dissection, on a larger fish (83 mm. S.L.).

In the descriptions that follow, bone nomenclature is essentially that used by Weitzman (1962).

Neurocranium (figs. 2–4): There is nothing outstanding about the general morphology of the neurocranium. In its overall proportions and appearance it resembles closely the neurocranium described for several cyprinid species (see Ramaswami, 1955 a and b; Harrington, 1955), and is very similar to that of *Barbus kerstenii* Peters (personal observations).

Olfactory region. The *nasals* are short, narrow and tubular bones.

The *supraethmoid* (figs. 2 and 4) is completely fused with the underlying ethmoid; posteriorly it articulates with the frontals through a deep, interdigitating suture. Its dorsal surface is deeply but broadly grooved; the indentation is more circumscribed and 'V' shaped anteriorly.

The *ethmoid* (figs. 2–4) is broad-based, but except along its transverse anterior margin (which is deeply notched) and for a short distance anterolaterally, the bone does not extend to the margin of the underlying *vomer*, which thus forms a narrow lateral platform around the ethmoid. Anteriorly and anterolaterally the ethmoid base slightly overreaches the vomer.

2mm

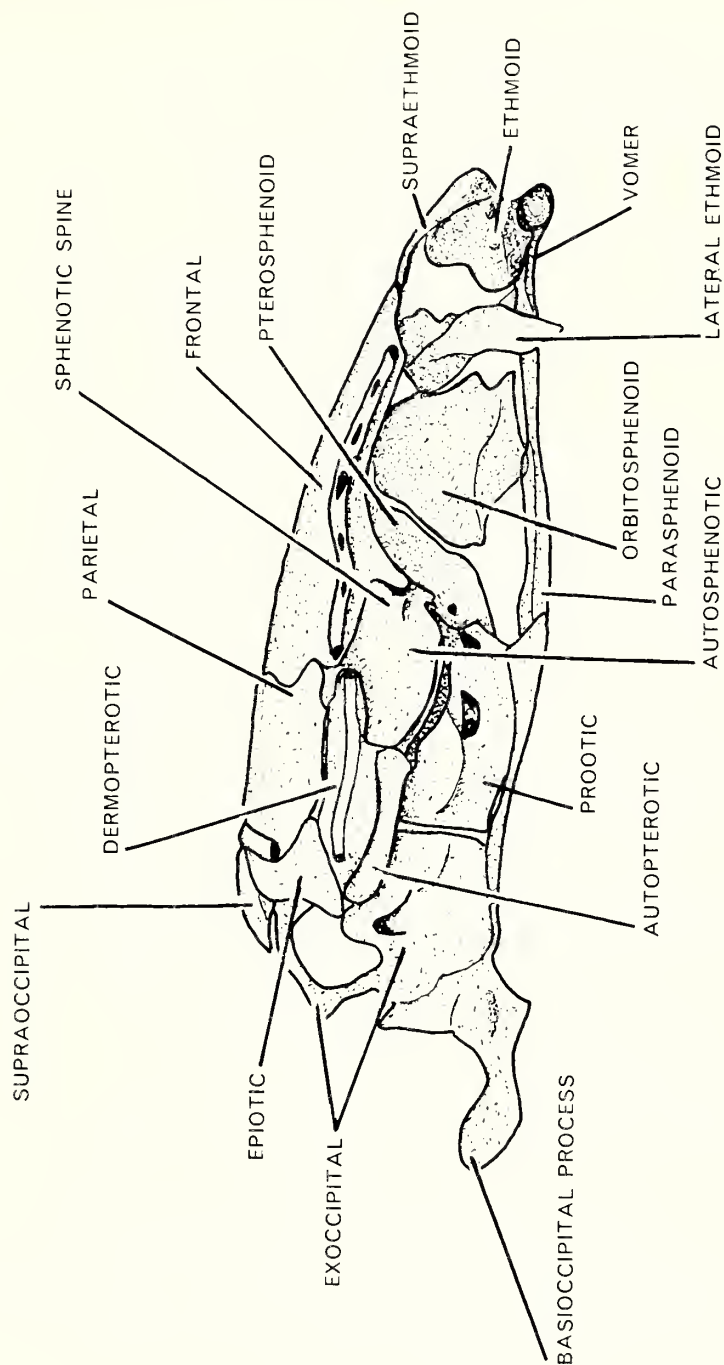


Fig. 2. *O. quathlambae*; neurocranium, right lateral view.

The vertical lamina of the ethmoid has a roughly kidney-shaped outline, the hilum facing posteriorly. In contact with the ethmoid and vomer anterolaterally are the large *preethmoids* (figs. 2-4). No "second preethmoids" (*sensu* Ramaswami) are visible in the alizarin preparations, but superficial dissection of an untreated specimen (83 mm. S.L.) revealed a large

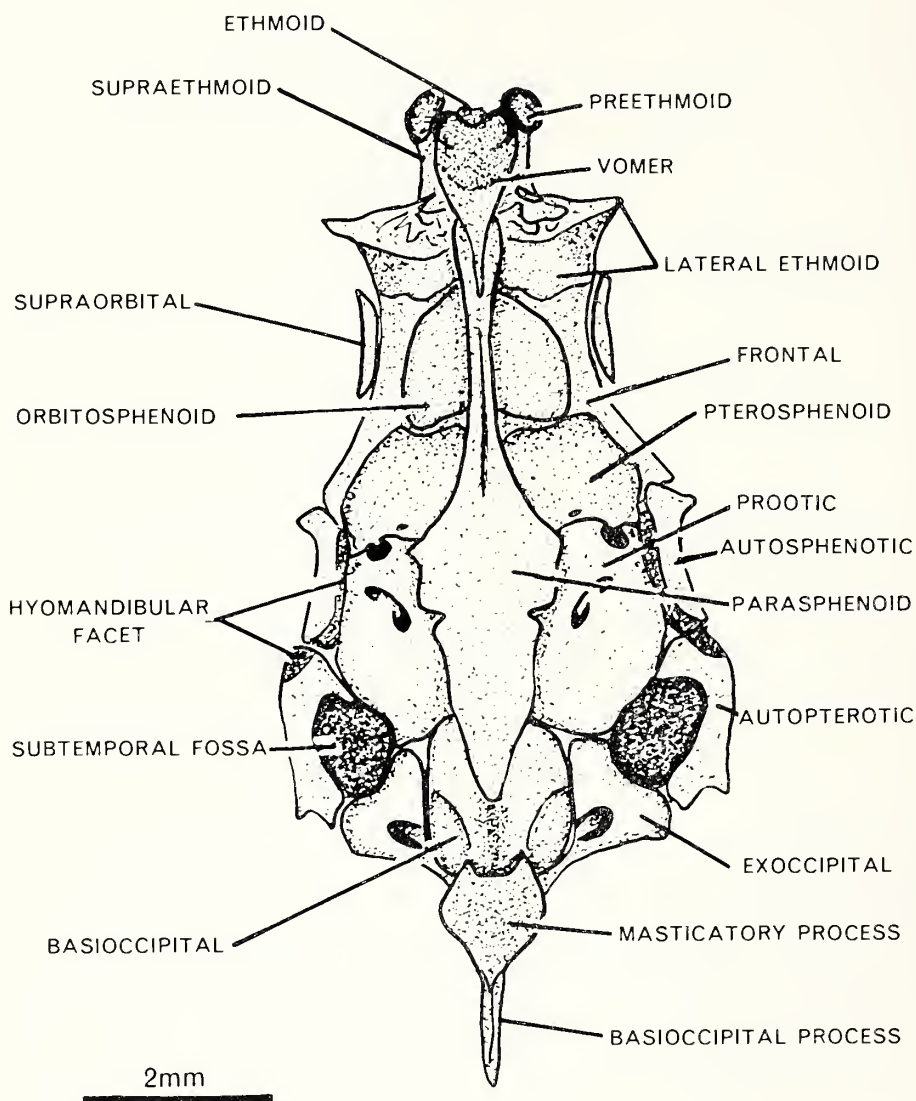


Fig. 3. *O. quathlambae*; neurocranium, ventral view.

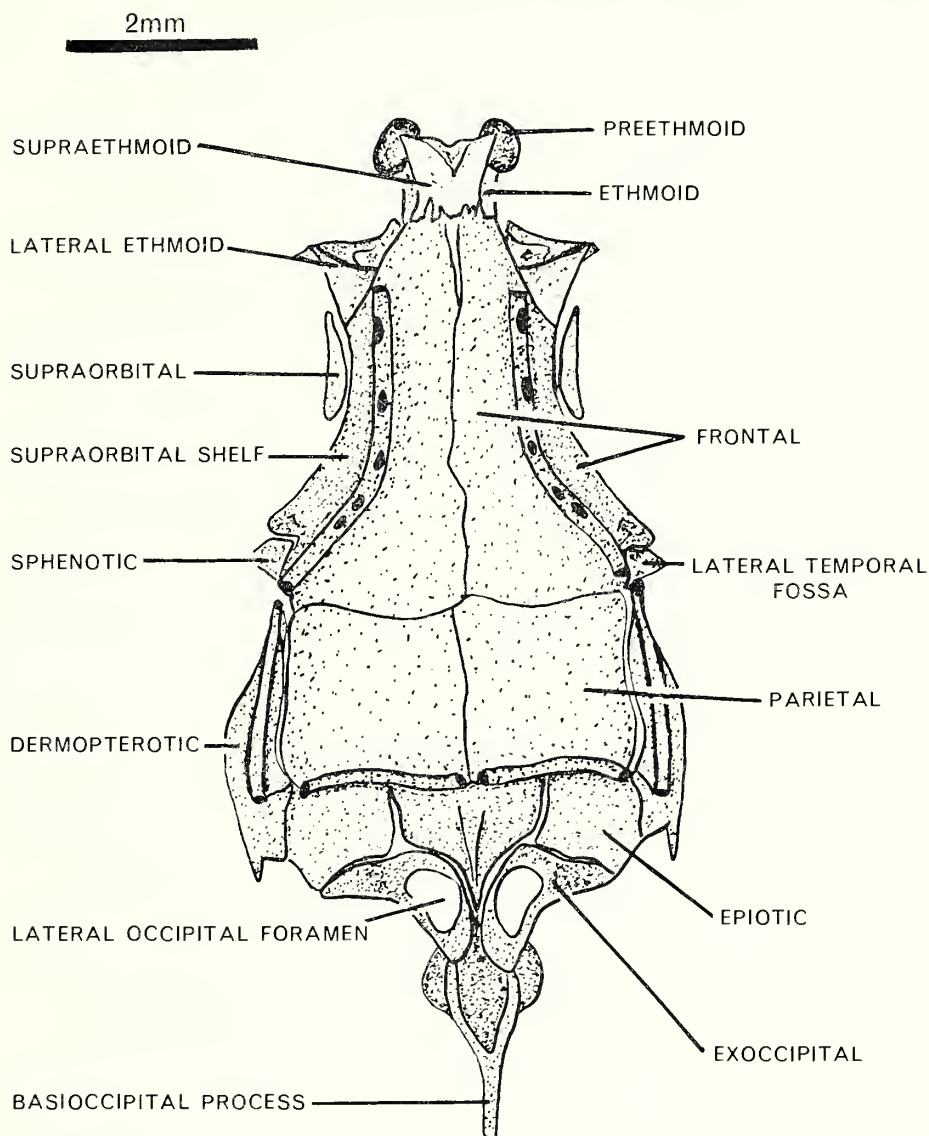


Fig. 4. *O. quathlambae*; neurocranium, dorsal view.

cartilaginous pad interposed between each preethmoid and the head of the maxilla and the palatine of each side. This cartilage seems to correspond with Ramaswami's second preethmoid, and is about the same relative size as the cartilage so labelled in his figures of *Gnathopogon*

elongatus and *Gobiobotia pappenheimi* (Ramaswami, 1955a). Unpublished and uncompleted studies (Greenwood and Meldrum) suggest that in many cyprinids the second preethmoid is a sesamoid cartilage (or ossification) developed in a ligament running from the palatine to the kinethmoid (rostral bone). Unfortunately, the necessary deep dissection could not be made on the large specimen of *O. quathlambae*, but from the superficial one carried out, the cartilage seemed to be a more discrete body than the meniscus developed in the palato-kinethmoid ligament of similar-sized specimens of *Barbus paludinosus*.

Since, in the material available, it is impossible to distinguish between the prefrontal and lateral ethmoid ossifications the bone forming the anterior orbital margin will be referred to as the *lateral ethmoid*. The lateral ethmoids of each side meet medially only at their bases, and are easily separated. Their anteromedial tips closely approach the ethmoid lamina but are not in contact with it. Posteriorly, contact between the lateral ethmoids and the orbitosphenoids is restricted to a small area on the dorsal third of the anterior margin of each orbitosphenoid. There is no distinct, tunnel-like *anterior myodome*; the eye muscles insert into a concavity on the medial aspect of each lateral ethmoid. No facet for articulation with the entopterygoid is discernible on the ventral aspect of the lateral ethmoid (as has been described in some, but not all, cyprinids studied by Ramaswami, 1955a and b).

The *orbitosphenoids* (figs. 2 and 3) are paired and easily separated. Ventromedially, a small area of the orbitosphenoids meets a dorsal projection from the parasphenoid, but the greater part of the ventral orbitosphenoid margin is free from the parasphenoid. Spatial relations between the lateral ethmoids and the orbitosphenoids are described above.

Otic region (figs. 2-4). The *prootic* (figs. 2 and 3) is distended by a prominent bulla acoustica utricularis; dorsally this bone carries a large part of the facet for the hyomandibular head. The *autosphenotic* carries the equivalent lateral component of the hyomandibular facet (see also page 28); anteriorly there is a moderately well-developed sphenotic spine which meets the downwardly curved supraorbital shelf of the parietal; the two bones contribute to a shallow, rather poorly-defined lateral temporal fossa (fig. 4).

The *auto-* and *dermopterotic* (figs. 2-4) cannot be separated. A narrow, anteriorly directed laminar projection surrounding the temporal lateral line tubule, and which overlaps the posterior part of the autosphenotic, seems to correspond to the bone called supratemporal-intertemporal-membranopterotic by Harrington (1955). Although this bone cannot be separated from the underlying pterotic, it has a distinct outline around the ventral side of the tubule and dorsoposteriorly to it; in fact, it gives the impression of being plastered onto the pterotic and fused with it (figs. 2 and 4). Laterally the pterotic is distended by the underlying horizontal semicircular canal, which forms a prominent ridge.

No *intercalar* (opisthotic) could be located in either of the specimens examined.

The *exoccipital* (figs. 2-4) is perforated by a large lateral occipital foramen, and by the relatively large vagus foramen. It is greatly swollen by a prominent bulge formed around the junction of the horizontal and posterior vertical semicircular canals. This eminence is only slightly smaller than that formed over the bulla acoustica utricularis in the prootic. Ventrally, the exoccipital is distended by part of the bulla acoustica lagenaris. A shallow *posttemporal fossa* lies medial to the semicircular canal junction in the exoccipital; the smaller, dorsal part of this fossa lies in the epiotic.

The *basioccipital* is distended posterolaterally on each side by the ventral portion of the bulla acoustica lagenaris, but otherwise its ventral face is flat. The posterior pharyngeal process of the basioccipital is a moderately stout structure carrying a broad, roughly cardiform masticatory process.

The *subtemporal fossae* are deep pits (fig. 3).

The *parasphenoid* and *epiotics* show no outstanding characteristics.

Roofing and associated bones (figs. 2 and 4). The *frontals* are approximately triangular in outline, with the hypotenuse gently concave above the orbits. The two frontals overlap in the midline along a broad, sinuous zone of contact; the overlap is irregular, with the left frontal superimposed along parts of the suture, the right in other parts. The dorsal contour of the frontals is slightly convex except for a relatively broad and flat shelf above each orbit; this shelf curves downwards rather sharply over the posterior third of the orbit. The supraorbital lateral line canal runs parallel with the lateral outline of each frontal, along the junction between the supraorbital shelf and the main body of the bone, and extends to its posteroventral margin. There is an appreciable gap between the supraorbital and temporal canals at their junction. In one specimen, on the right side only, the two canals lie at different horizontal levels.

The *supraorbitals* are narrow, and occupy only a small part of the supraorbital indentations of the frontals.

The *parietals* are large, rectangular and almost square bones, with the supratemporal cross-commisure of the lateral line running along their posterior margins; the canals are firmly fused with the parietals, and no distinct median extrascapular bones could be distinguished. Each supratemporal canal ends laterally at the posterior angle of the parietal; that is, it is not continued beyond the body of the parietal as in certain cyprinids, e.g. *Notropis cornutus* (Harrington, *op. cit.*).

Posteriorly, the supraoccipital crest juts out and forms a stem to the shield-shaped *supraoccipital*. This crest is low and fairly broad; on either side of it lies a broad but shallow concavity in the otherwise convex surface of the supraoccipital. The concavities extend forward almost to the anterior margin of the bone.

The *extrascapular* (supratemporal) is a broad, bluntly triradiate bone carrying the Y-shaped, but very unequally armed, supratemporal canal. It is loosely applied to the epiotic and pterotic bones, and partially overlaps the dorsal part of the posttemporal. The *posttemporal* itself (fig. 5) has a stout head through which runs the lateral line canal, and a slender, deeply grooved vertical limb which is closely applied to the dorsoposterior aspect of the supracleithrum. The ventromedial aspect of the posttemporal head is flattened, and is firmly bound to the epiotic by a broad, stout ligament.

Circumorbital and opercular series. There are only four *circumorbital bones*; all are thin and not greatly expanded. The first (lachrymal) is the broadest in the series, the third is the longest. The fourth bone, presumably the *dermosphenotic*, is flimsy, thin and poorly ossified. Although there is a distinct suture between this ossicle and the stouter third one, the canal passes uninterrupted from the latter bone onto the dermosphenotic (fig. 6). The dorsoposterior margin of the dermosphenotic fits into the gap between the dermopterotic and the frontal (see page 24); thus the openings of the temporal, supraorbital and infraorbital lateral line canals are brought into approximate juxtaposition, but there is still an appreciable gap between their respective openings.

Little need be said about the *opercular series* except to note that there is no "supra-preopercular" sensory canal developed in the anterodorsal angle of the operculum. This canal has been described in several other cyprinids (see Ramaswami, *op. cit.*). Neither could we locate, with certainty, any of the foramina for the ramus opercularis superficialis VII which Harrington (*op. cit.*) described in *Notropis cornutus*. However, there is a vertical tubular canal lying just behind the thickened anterior margin of the operculum; the upper opening of this canal is mesial, and is situated immediately below the socket which received the opercular boss of the hyomandibula. This tube may correspond to a similarly situated canal in *N. cornutus*; in that species the tube carries a lower branch of the ramus to supply sense organs on the ventral and antroventral aspects of the operculum (Harrington, *op. cit.*).

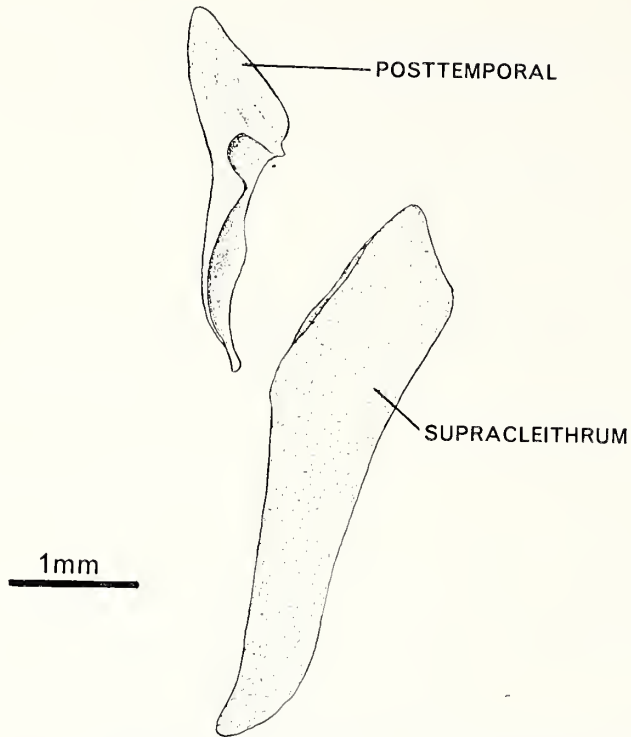


Fig. 5. Right posttemporal and supracleithrum of *O. quathlambae* in lateral view (from a specimen 83 mm. S.L.)

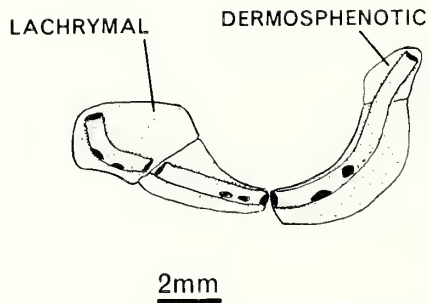


Fig. 6. Left circumorbital bones of *O. quathlambae* (from a specimen 83 mm. S.L.).

Oromandibular region. Jaws (figs. 7-9). Each *premaxilla* (fig. 7A) is a relatively deep bone, with a short but well-defined, rather slender ascending (rostral) process aligned perpendicularly to the long arm of the bone. This type of premaxilla is found in many *Barbus* species, and is quite unlike that in *Labeo* (see Ramaswami, 1955b). The premaxillae curve medially to form a loose symphysis with each other in the midline.

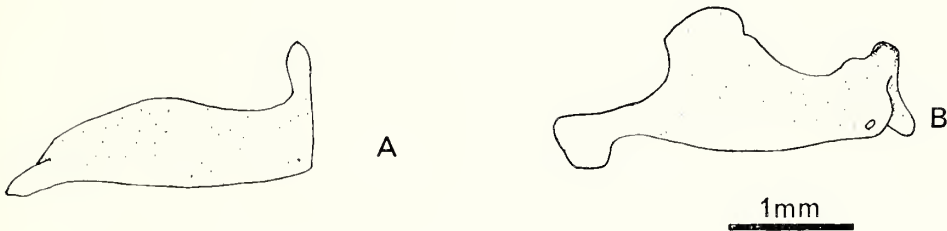


Fig. 7 A. Right premaxilla (lateral view) of *O. quathlambae*.
B. Right maxilla (lateral view) of *O. quathlambae*.

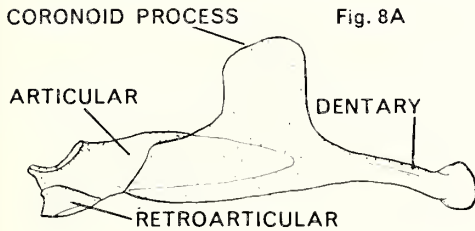


Fig. 8A

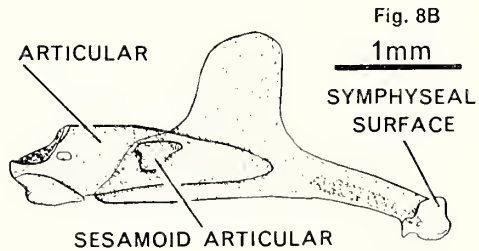


Fig. 8B

Fig. 8A. Right lower jaw (in lateral view) of *O. quathlambae*.
B. Left lower jaw (medial aspect) of *O. quathlambae*.

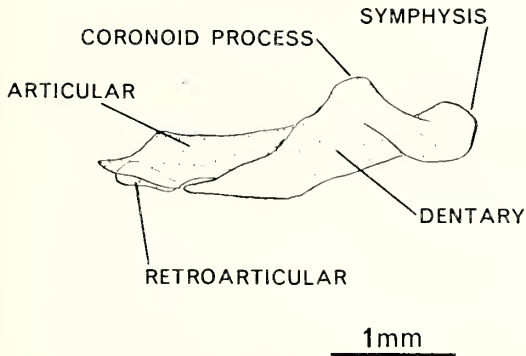


Fig. 9. Right lower jaw of *Labeo niloticus*, viewed slightly dorso-laterally.

Also *Barbus*-like is the *maxilla* (fig. 7B), which has a moderately developed, medially directed rostral process, and a small but distinct anterodorsal boss for articulating with the preethmoid. At about the middle of the maxilla, the dorsal margin is drawn up into a long-based and prominent process; posteroventrally there is a small flange which slips mesially under a short posterior prolongation of the premaxilla.

Each ramus of the *lower jaw* (fig. 8) has a typical complement of four bones. The *dentary* has a high, fairly broad-based coronoid process, and a slender, subcylindrical, mesially curved precoronoid arm which is slightly expanded dorsoventrally at the symphyseal face. The dorsal surface of the precoronoid arm is somewhat flattened and slightly overhangs the anterior face of the underlying bone. There is, apparently, no trace of a mandibular lateral line canal on the dentary, and nor are any mandibular pores visible on the lower jaw of an entire fish. This condition seems to be unique, but should be investigated further before a definite conclusion can be reached; regrettably the material at our disposal is not suitable for the detailed dissection and histological examination which would be necessary to check this point.

The *articular* is a long, substantial bone, notched dorsoposteriorly by the articulatory surface for the head of the quadrate. Almost mirroring this notch is a ventral excavation in which the *retroarticular* (angular) lies. The *sesamoid articular* lies on the medial face of the articular at about its midpoint and a little below its dorsal margin.

The lower jaw of *O. quathlambae* is quite unlike that in *Labeo*, as a comparison of figures 8A and 9 will show (see also Ramaswami, 1955b, fig. 16, page 221, and page 19). It does not, however, differ greatly from the lower jaw in the several *Barbus* species we have studied.

Part of the *suspensorium* is illustrated in figure 10, and requires no comment except to note that the symplectic is relatively longer than in *Labeo*.

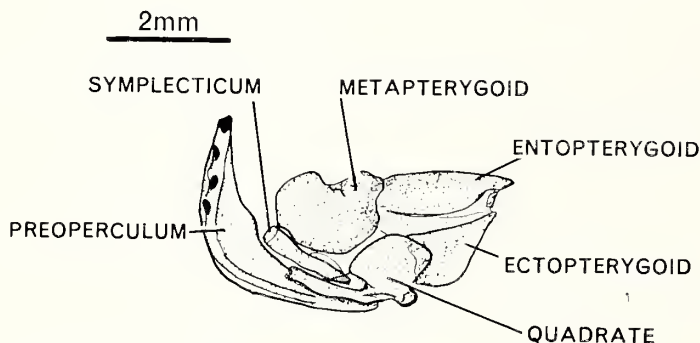


Fig. 10. Part of the right suspensorium of *O. quathlambae*, in lateral view.

Hyoid arch. The hyoid arch shows no outstanding characteristics; the *epi-* and *ceratohyals* are moderately stout and short bones, and the *hypohyals* are double. The *urohyal* is illustrated in figure 11. The *branchiostegal* rays are slender, elongate and gently curved bones.

The *hyomandibula* is short and broad, with two ill-defined heads; its articulatory facet on the neurocranium is formed principally by grooves along the junction of the prootic and autosphenotic bones (fig. 3), but posteriorly there is a small area contributed by the autopteric, and anteriorly a minute facet on the pterosphenoid.

Branchial skeleton and pharyngeal bones (figs. 12–14). The branchial skeleton is essentially as described for other cyprinids (Ramaswami, 1955 a and b; Harrington, 1955). The *ceratobranchials* are fairly stout, but the *epibranchials* are slender. Gill rakers on the ceratobranchials of all four gill-bearing arches are short and acutely conical; there are two rows of 6–8 rakers on each arch. The first *pharyngobranchial* is reniform, and pharyngobranchials two and three are fused into a large, broad, trianguloid plate. The pharyngobranchials of each side are contiguous, the two fused elements slightly overlapping the first along the dorsal side of its posteromedial angle. An unossified third pair of pharyngobranchials has been described in some cyprinids (see Harrington, *op. cit.*), and are probably present in *O. quathlambae*. The alizarin technique does not stain cartilage, but probing with a needle in the gap between the fourth epibranchial and the fused second and third pharyngobranchials indicates that the tissue is more resilient than would be expected if it was only connective tissue and muscle.

The first two pairs of *hypobranchial* bones are short, dumpy and somewhat compressed rods, but the third pair are more slender and have long, curved ventromedially directed processes. There are three median *basibranchials*; the dumbbell-shaped, and cylindrical second and third elements are subequal in length, the spatulate first basibranchial about half their length.



Fig. 11. Urohyal of *O. quathlambae* in left lateral view.

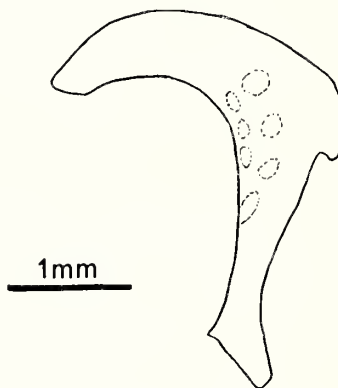


Fig. 12. Outline of right pharyngeal bone from a specimen of *O. quathlambae* 40 mm. S.L. The bone is laid flat on its lateral aspect. Alveoli of the teeth are indicated by broken lines.

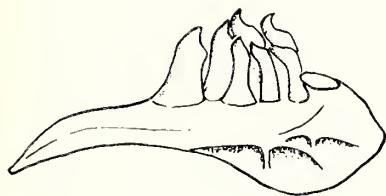


Fig. 13. Left pharyngeal bone and teeth of *O. quathlambae*, dorsal aspect, from a specimen of 83 mm. S.L.



Fig. 14. Left pharyngeal bone and teeth of *O. quathlambae* (83 mm. specimen), viewed somewhat dorso-medially (two positions) to show crown shape in teeth; about $18 \times$ N.S.



The *pharyngeal bones* (figs. 12 and 13) are distinctly falcate, with a prominent anterior angle which is produced slightly in an anterolateral direction; the posterior angle is so smoothly incorporated into the curve of the posterior limb that it is not discernible. Each bone is about 3.3 times as long as broad; the anterior limb is slightly shorter than the posterior one (nomenclature and reference points after Chu, 1935). The pitted surface is moderately broad; in the smaller specimens it extends almost to the tip of the posterior limb, but only to about halfway between the posterior tooth and the tip of the posterior arm in the larger fish. In specimens of all sizes, the pits extend to the level of the anterior angle.

The pharyngeal teeth (figs. 13 and 14) are arranged in two rows, the outer with three teeth, the inner with four. Teeth of the inner row have relatively stout necks, subcylindrical in cross-section; the crowns are expanded and slightly broader than the necks, and are inclined anteriorly at an appreciable angle to the posterior margin of the neck. In cross-section, the crowns are concave above, giving a spoon-like occlusal surface; their tips, however, are conical, produced and strongly curved posteriorly. The two anterior teeth in this row are coarser than the posterior pair, and have their crowns less obliquely inclined.

Outer row teeth resemble those of the inner row but are smaller and more slender; the posterior tooth in this row has its crown inclined almost at right angles to the posterior margin of the neck.

Comparison of the pharyngeal bones and teeth from the smaller specimens (*ca* 40 mm. S.L.) with those from the large fish (83 mm. S.L.) do not indicate any appreciable difference in bone shape or tooth form.

Although we have not been able to examine the pharyngeal teeth in every species of African *Barbus*, the sample we did study indicates relatively little intrageneric variation in tooth form. The most pronounced differences seem to be associated with an increased "molarization" of the crowns (especially of the anterior teeth in the principal row) in certain species. The chief types of tooth morphology in *Barbus* are illustrated by Matthes (1963; plate VII). On these basic types are superimposed slight differences in crown form, but in some species spoon-shaped, obliquely curved crowns approaching the *O. quathlambae*-type are seen in teeth of all rows (this is especially so in *B. treurenensis*). We have not encountered a pharyngeal dentition of the *O. quathlambae*-type in any of the Asian or European *Barbus* species we have studied, nor have we seen it illustrated. Likewise the pharyngeal teeth of other cyprinid genera in Africa do not approach the *O. quathlambae*-type (except that in some the dentition is biserial). Comparisons made with representative species of several North American, Asiatic and European genera also serve to emphasise the uniqueness of the pharyngeal dentition in *O. quathlambae* (and, incidentally, the relative uniformity of tooth shape in the leuciscine genera, and some groups of the Gobioninae).

Weberian apparatus (figs. 15 and 16). The apparatus is carried on two discrete (the first and fourth) and two fused centra (the second and third). The centrum of the first vertebra is almost the same length as that of the fourth. Its lateral processes are relatively short and slender; when viewed from above each process has a weakly sigmoid outline, and is directed ventrally. The lateral processes of the fused vertebrae are much longer and stouter; the process of each side arises near the anteroventral border of the centrum. Basally, the process is curved anteriorly and somewhat ventrally, but it then bends sharply upwards and backwards. A pair of stout, ventrally directed ribs are associated with the fourth vertebra; medially from each rib there is a long but broad-based os suspensorium. The ossa suspensoria are closely apposed in the midline but do not contact. Compared with the fourth ribs in the *Labeo* species examined, those of *O. quathlambae* are very slender and narrow-based. Slender fourth ribs are apparently also characteristic of *Barbus* species, particularly in those with adults attaining only a small size. In some species with large adults (e.g. *B. tanensis* and *B. altianalis*) the ribs are stout, but are still relatively more slender than in *Labeo* species, irrespective of the adult size.

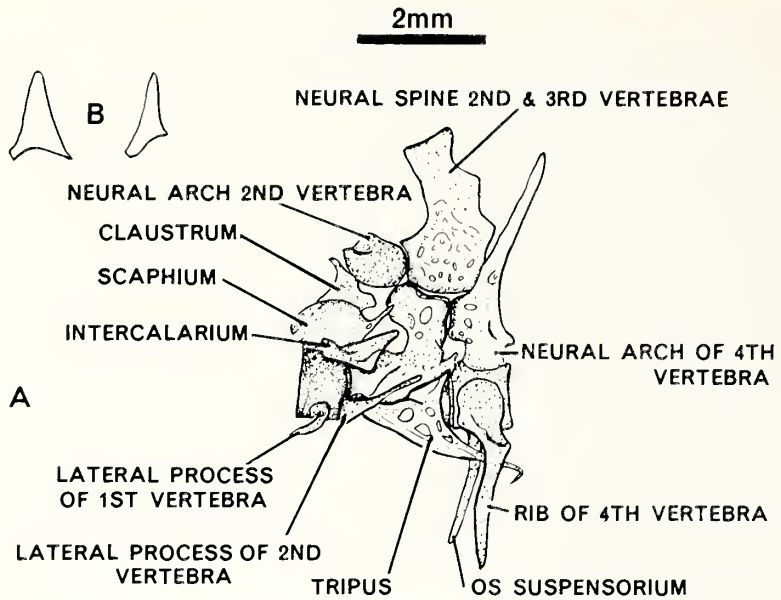


Fig. 15. Weberian apparatus of *O. quathlambae*.
A. Entire apparatus in left lateral view (40 mm. specimen).
B. Left intercalaria from two specimens (both ca 40 mm. S.L.) to show variation in outline.

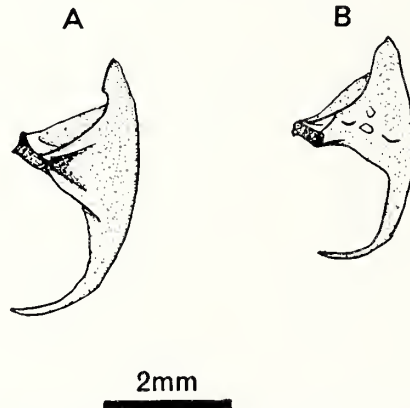


Fig. 16. Right tripus (dorsal aspect) of : A. *Labeo niloticus* B. *Oreodaimon quathlambae*.

Ossicles. The *claustrum* is a large slightly concavo-convex and trianguloid bone. A thickened lateral ridge, at a point about one third of the distance from the ventral margin, indicates the zone of contact between this bone and the scaphium.

The *scaphium* is roughly hemispherical, with a thin, backwardly directed spine arising from about the middle of its posterior margin. A stout, ventrally directed peg on the ventral margin articulates with a deep socket situated dorsolaterally on the first centrum.

The thin *intercalarium* is basically triangular in outline. In one specimen, the base of the triangle is broad, and the outline of the bone is proportionately broad. In the other fish, however, the base is short, and consequently the bone is narrow and spicule-like (see fig. 15B). The intercalarium articulates with a deep pit lying dorsolaterally on the anterior third of the fused centra. Compared with the intercalarium of *Labeo* (12 species examined) and *Barbus* (5 African and 2 Eurasian species), that of *O. quathlambae* is larger and coarser; also, in the *Labeo* and *Barbus* species it is clearly triradiate, with distinct but unequal arms. The same characteristics distinguish the intercalarium of *O. quathlambae* from that of *Saurogobio duneri*, *S. dabryi* and *Gobiobotia pappenheimi* as figured by Ramaswami (1955a). The intercalarium of *Gobio polytaenia* (Ramaswami, *op. cit.*) and *Gobio gobio* (personal observations) is relatively as long as that of *O. quathlambae*, but is more slender and rod-like, thus approaching the condition found in one of the *O. quathlambae* specimens. The closest resemblance to any other figured species is with the intercalarium of *Vimba vimba* and *Alburnoides bipunctatus* (see Chranilov, 1927).

The *tripus* is essentially like that described by Ramaswami (1955 a and b) for *Notropis cornutus* and *Pseudogobio esocinus*, and the *tripus* of all African *Barbus* species examined by us. Although basically like the *tripus* in *Labeo*, it differs somewhat in that the *Labeo* *tripus* has a deeper articulatory surface, and the limb connecting this face with the horizontal part of the bone is broader and is reinforced dorsally by two vertical ridges which converge at the articulatory head (see fig. 16). The *tripus* articulates with a shallow pit lying midlaterally on the posterior half of the fused vertebral centra.

Pectoral girdle (fig. 17). The various elements of this girdle show no outstanding characteristics. The cleithrum has a wide lateral shelf developed from the horizontal limb; the anterior tip of this shelf is deeply and obliquely emarginate. The wide vertical limb of the cleithrum is somewhat shorter than the horizontal limb. The single *postcleithrum* is a substantial, sub-cylindrical and rib-like bone which curves posteriorly and ventrally.

The club-shaped *supracleithrum* (fig. 5) is loosely bound, over its lower two-thirds, to the lateral face of the cleithrum; the upper third of the *supracleithrum* is thicker, and has an ill-defined facet on its posterior face. This facet lies in the deeply grooved anterior face of the posttemporal (see page 25).

DISCUSSION

Taken in concert, the biserial pharyngeal dentition, the peculiar crown-form of these teeth, the small scales (absent from the chest), and the unspecialized mouth of *O. quathlambae* provide a character complex which trenchantly separates this genus from all other African Cyprinidae. This high degree of distinctiveness immediately raises questions about the derivation of the genus, and its position within the family.

At the generic level, *Oreodaimon quathlambae* cannot be closely allied with such genera as *Barilius*, *Leptocypris*, *Engraulicypris*, *Chelaethiops* or *Coptostomabarbus* (see, especially Matthes, *op. cit.*, for descriptions of jaw and pharyngeal structure in these fishes). Thus, one is left with *Barbus*, *Labeo*, *Varicorhinus*, *Garra*, *Prolabeo* and *Prolabeops* as possible relatives, if *O. quathlambae* evolved from a stem represented by other extant derivatives in Africa. Again, each of these genera is readily distinguished from *O. quathlambae* at the generic level, but the separation is less obvious at a suprageneric level. Two characters, the biserial pharyngeal teeth, and the crown form in these teeth, are probably the only ones which do not conform at

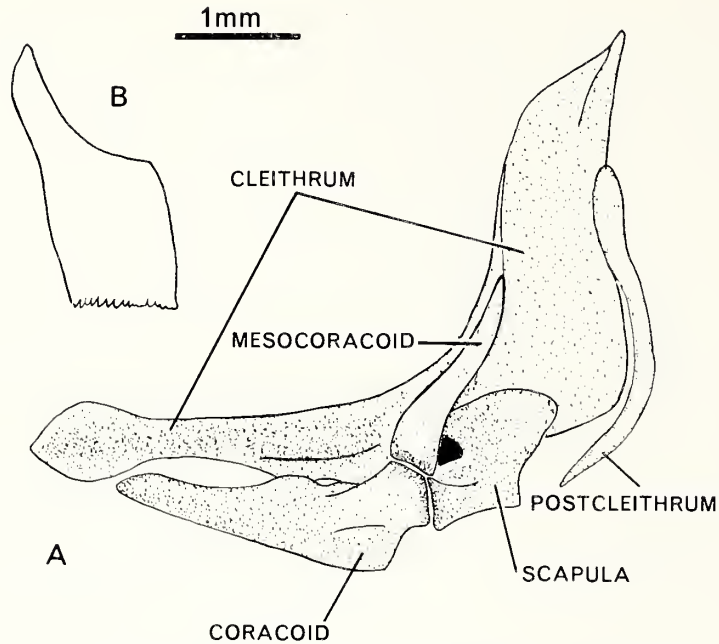


Fig. 17 A. Right pectoral girdle of *O. quathlambae*, medial aspect.
 B. Anterior tip of right cleithrum, viewed from above.

that level. The number of tooth rows seems to be of some phyletic significance, although the reasons for intragroup constancy in this character are not apparent. Take, for example, the genus *Barbus*. Here there are species showing every trophic specialization (except, possibly, exclusive vegetarianism), and these are, to a certain extent, reflected in the morphology of the pharyngeal teeth (Matthes, 1963; personal observations). But, the teeth are invariably triserial. In *Labeo* (an exclusively vegetarian species group), triserial teeth are also invariable. On the other hand, the trophically varied leuciscine genera of Eurasia and America have biserial or, rarely, uniserial pharyngeal teeth.

Attempts to split the Cyprinidae on a subfamilial basis have not proved successful. Ramaswami (1955b), after investigating the cranial osteology of several genera, concluded that "... I have not been able to find a set of them [skull characters] as distinguishing each of the subfamilies of the Cyprinidae." Earlier, Regan (1911) reached virtually the same conclusions after examining, albeit somewhat more superficially, a greater variety of characters; however, Regan was able to indicate certain groups as being better defined than the others. Chu's (1935) studies on the scales and pharyngeal dentition of Chinese Cyprinidae suggest that these structures are also of little value in helping to define subfamilies, although in certain groups they may aid in the recognition of a modal group condition.

In part, the difficulties encountered in defining subfamilies are due to insufficient detailed knowledge about most character systems in this vast and varied family. This impediment must also affect any considerations we may make about the taxonomic position of *O. quathlambae*.

Nikolski (1954) used tooth row numbers, together with other characters (squamation, relative lengths of median fin bases, etc.) as criteria for recognising nine subfamilies of Soviet Cyprinidae. On Nikolski's scheme, *O. quathlambae* most closely approaches the subfamily Gobioninae, differing from other members principally in having such small scales. It also approaches his subfamily Barbinae, but differs in not having a triserial pharyngeal dentition. Although no obvious gobionines are present in Africa, the ill-defined position of *O. quathlambae* relative to the Gobioninae and Barbinae (*sensu* Nikolski, Cyprininae of others) warranted a close comparison of this species with true gobionines.

Ramaswami's (1955a) osteological studies immediately showed that several gobionine genera differ quite markedly from *O. quathlambae* in details of the neurocranial architecture, and in the Weberian apparatus. But, there is quite close correspondence in these characters between *O. quathlambae* and more generalized members of the subfamily (e.g. *Gobio* and *Gnathopogon* spp.). Parenthetically, it should be noted that these remarks also apply to generalized species of the Barbinae.

The chief differences between the basic gobionines and *O. quathlambae* lie in squamation and the shape of the pharyngeal teeth (but not in their serial arrangement). Crown shape in the species of *Gnathopogon* we examined (*G. polytaenia* and *G. elongatus*) differs considerably from that in *O. quathlambae*, and from that in the species of *Gobio* we studied (*G. gobio*, *G. uranoscopus*, *G. argentatus*, *G. nummifer* and *G. zoldatovi*). In turn, the teeth of *O. quathlambae* differ from those of the *Gobio* species, but to a less marked degree. However, none of the *Gobio* species shows a crown shape as near to that of *O. quathlambae* as some we observed in various African species of *Barbus* (e.g. the posterior teeth in *Barbus kerstenii* and *B. paludinosus* (both from east Africa), and particularly *B. gurneyi* and *B. birchelli* from South Africa).

Thus, to summarize, *Oreodaimon quathlambae* agrees with the Gobioninae in having a biserial pharyngeal dentition, but differs in the shape and number of the teeth, and in having very small scales. Small scales occur in various species of Barbinae (e.g. certain *Barbus* and *Labeo* species) and some species do have certain pharyngeal teeth which approach the *Oreodaimon*-type, although the total dental pattern (tooth shape, number and disposition) is dissimilar.

On this sort of evidence only the most tentative conclusions can be reached, but we believe (with that reservation) *O. quathlambae* to be nearer the Barbinae than the Gobioninae, and certainly nearer these than any other subfamily, except possibly the Leuciscinae. Affinity with the Leuciscinae was rejected on the grounds of *O. quathlambae* having an emarginate anterior tip to the cleithrum, and because of its pharyngeal tooth morphology (especially considering the relative constancy of tooth form in those North American leuciscines which *O. quathlambae* most resembles).

On zoogeographical grounds as well as on anatomical ones, *O. quathlambae* is probably a derivative of the Barbinae, and, for the moment it should be included in that group. The blurred phenetic affinities of *O. quathlambae* serve to emphasise the difficulties of producing biologically satisfactory subdivisions of the Cyprinidae.

If *O. quathlambae* is a member of the Barbinae, it must have evolved from a *Barbus* or *Barbus*-like ancestor. Other members of the subfamily are too specialized to be considered. No extant African *Barbus* species shows the sort of characteristics which might be indicative of the species-group from which *O. quathlambae* evolved, although in *B. treurenensis*, an endemic species isolated in a mountain stream in the north-eastern Transvaal, certain pharyngeal teeth have crowns very like those of the teeth of *O. quathlambae*. The very distinctive characters of *O. quathlambae* hint at a long isolation from the *Barbus* stem. Certain of these characters, such as the small scales, naked chest, flattened ventral profile and horizontally inserted pectoral fins, probably are adaptations to mountain stream habitats. What is surprising,

however, is the absence in Africa of other *Barbus* derivatives showing similar adaptations. For instance, *Barbus anoplus* occurs in mountain stream habitats, yet it retains all the characteristics of a typical *Barbus* species. This suggests that the *Barbus* 'bauplan' can be successful in the demanding environment of a mountain stream without undergoing any morphological adaptation. Perhaps the greater specializations (physiologically as well as anatomically) of *O. quathlambae* have contributed to its extinction.

NOTE ON THE TYPE LOCALITY

We are indebted to Mr. R. S. Crass of the Natal Parks, Game and Fish Preservation Board, for a detailed description of the type locality. The Umkomazana River rises at an altitude of about 9,000 feet some ten miles west-north-west of the area in which the collection of *O. quathlambae* was made. The upper valley leads to the Sani Pass over which a rough road enters Lesotho (Basutoland). The Drakensberg Escarpment is subject to periodic rain or snow throughout the year and the headstreams, rising near the crest, are torrential with numerous cascades and waterfalls. The headstreams of the Umkomazana unite to form the upper river which continues to flow down a steep narrow valley incised into the sandstones and shales of the Stormberg Series. The gradient of the valley for the last mile or so above where the fish were found is about 1 in 50, but the type locality, approximately 5,100 feet above sea level, is at a point where the valley opens out and becomes less steep. This part of the valley is on Beaufort Beds.

The stream bed consists of rounded boulders, stones and sand which shift readily in times of flood. When the river is low there are slowly flowing pools and flats, with riffles in between. There is a broad flood plain with sandy soil full of water-worn rocks, and the stream readily changes its course when in spate. Since early this century denudation of grass cover by grazing animals in the upper catchment area has tended to accentuate the severity of floods and scouring after heavy rain. Riparian vegetation consists of a sparse growth of grasses and sedges, with thickets of the shrub *Leucosidea sericea*. Aquatic vegetation is almost entirely absent. The mean width of the pools in the dry season is about 30 feet and the normal low flow is of the order of 15 cusecs.

Below the type locality of *O. quathlambae* the river has a gradient of 1 in 300 or 400 with an unstable stony bed for about a mile, until a dolerite sill causes a waterfall which is high enough to form a barrier to fish moving upstream. No specimens of *O. quathlambae* have ever been recorded from the river system below this waterfall, or the Umkomas River into which it flows, and no other indigenous fishes, including the common large *Barbus*, *B. natalensis*, from above it.

Brown trout, *Salmo trutta*, were first introduced into the Upper Umkomazana River at some time between 1910 and 1920, the exact date not being known. Later, in 1926 and 1927, additional stockings of *S. trutta* and also of rainbow trout, *S. gairdneri* were made. The latter species did not become established but a breeding population of *S. trutta* has been maintained to this day. The trout are affected by both floods and droughts, numbers fluctuating from year to year due to the instability of the habitat.

Thus, early this century this unique and specialized species, *O. quathlambae*, which had survived in the sanctuary of the Upper Umkomazana River out of reach of other indigenous fishes, became faced with the presence of a large predator, *S. trutta*, a serious competitor for food, and a deteriorating habitat—all of which have no doubt contributed towards the disappearance of *O. quathlambae* from its type locality.

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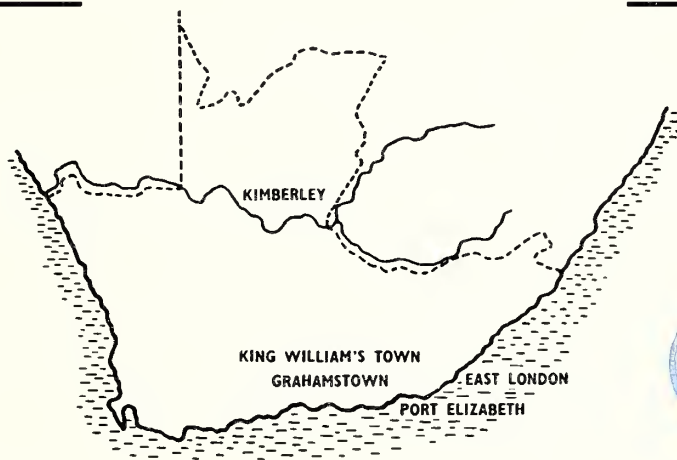
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The racial taxonomy of South-East African populations of the Long-Billed Lark

by

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Although the Long-billed Lark *Certhilauda curvirostris* (Hermann) has enjoyed the attention of many eminent taxonomists, considerable uncertainty still prevails as to the systematic grouping and nomenclature best employed in describing the infraspecific populations as they occur east of long. 25 in southern Africa. The prime reason has been a shortage of material, and although a fair series is now available, the collecting points are rather widely scattered and few in number, especially in the eastern Cape, Orange Free State and the Transvaal. It is also doubtful whether, with recent collecting in Natal and the eastern Cape, all the available material has been brought together and critically analysed. The main impetus towards initiating this study was, however, given by the recent acquisition of a good series of specimens from Thomas River (Cathcart district) which could not be allocated to any known race.

All available South African sources were approached for loans of material of this lark which led to the eventual accumulation of a series of some 200 bird skins.

GEOGRAPHICAL VARIATION

It is expedient at this juncture to review briefly the complete picture of the variation of the Long-billed Lark over southern Africa (excluding South West Africa from where no specimens were seen).

In the assembled series three broad groupings were at once obvious. Each could be likened to a semispecies, as they are all set apart (allopatric) from one another, with no obvious intergradation, each containing a typical galaxy of subspecies with the usual transitional populations.

The first of these three groups is the one occupying the white sands of the largely arid western sea-board, the birds being characterized by their large size, long bill and the sombre coloration of the plumage which lacks the warmer colours of the other two groups. *C.c. curvirostris* (Hermann) and *C.c. falcirostris* Reichenow fall within this first category. The second group is one occupying the coarser substrata and redder soils of the interior, covering a large area from South West Africa through the north-west Cape and the greater part of the Karroo of the central Cape. Races represented here are *C.c. bradshawi* (Sharpe), *C.c. subcoronata* Smith and *C.c. gilli* Roberts. These differ markedly from races of the first group in the warm rufous or vinous upperside feathering, smaller beak and generally less heavily striped undersurface. At the eastern extremities of the Karroo another sudden transition takes place where birds lose the whitish underside, becoming instead distinctly buffy, and with the streaking reduced and confined to the breast. These are the birds of the 3rd group on which attention is here focussed, the recognized races of which bear the names *C.c. semitorquata* Smith, *C.c. daviesi* Gunning & Roberts and *C.c. transvaalensis* Roberts. It is also within this group that the new eastern Cape Province race falls.

It should be pointed out that in the n.w. Cape, about the Richtersveld, *C.c. falcirostris* actually occurs together with *C.c. bradshawi* with no visible signs of interbreeding although it

must be admitted that only one specimen of *C.c. falcirostris* and three specimens of *C.c. bradshawi* were collected together in the same area near Kuboos. However the sharp distinction between the structural and colour facies of abutting populations of these two groups is not so apparent further south along the southern Cape coastal strip and it may yet be shown that *C.c. brevirostris* Roberts here represents a link between group one and two. However, lack of sufficient material, precludes a closer study of the matter at this stage.

Longitude 25° E. could, for convenience, be regarded as a rough line of separation (at least in the Cape Province) between groups two and three and here again intergrading populations are not so far evident. It was no doubt these factors which led Austin Roberts (1936) to treat these three groups as conventional species, although the reasons for regarding *C.c. damarensis* (Sharpe) as a separate species are not so obvious.

Within group three, the character trends are rather typical, showing a decreasing intensity of rufescence from north to south, accompanied by an increase in ventral and dorsal streaking as evidenced by the dark umber feather centres. The most northern race *C.c. transvaalensis* is the race with its dorsal plumage bearing the greatest intensity of rufescence and the darkest buff underside. Coupled with these characters is the extreme suppression of dorsal and ventral streaking, being all but absent in some specimens. Ventral streaking when present is virtually confined to the breast. This race occupies the Transvaal and the more northern and western parts of the Orange Free State and Natal. Moving south from the southern limits of *C.c. transvaalensis* the Long-billed Lark becomes slightly darker and duller dorsally, having a more vinaceous tinge. This is the subspecies known as *C.c. semitorquata*, of which many specimens are also more heavily streaked above and below. This breast streaking in some specimens is rather sagittate in outline. *C.c. semitorquata* enjoys a wide range, occupying the south-eastern parts of the Orange Free State, most of Natal, most of the eastern Cape and Lesotho. Proceeding still further south we find in the eastern Cape a race which in dorsal coloration is no longer clearly rufous but is colder in its range of colours, i.e. closer to the violet-indigo end of the colour spectrum, these being various shades of dull vinaceous. This race is also paler below and with the breast feather markings darker, more prominent and markedly sagittate. Although it seems to occupy the smallest range, this race differs more from *C.c. semitorquata* than *C.c. semitorquata* differs from *C.c. transvaalensis*. To this interesting new subspecies the name *Certhilauda curvirostris algida mihi* is proposed as being descriptive of the overall colder coloration of the plumage.

As will be substantiated later in this paper *C.c. daviesi* is treated here as a subjective synonym of *C.c. semitorquata*. The specimens taken to represent *C.c. semitorquata* by authors recognising the validity of *C.c. daviesi* were all examined personally and found to be indistinguishable from topotypes of *C.c. daviesi*. As far as present evidence will permit it will also be shown that Smith's name *C. semitorquata* cannot be applied to the new race from Thomas River since his descriptions, plates etc. clearly refer to birds known as *C.c. daviesi* or *C.c. semitorquata* by all authors.

HISTORICAL REVIEW

When the nomenclature of these eastern races was reviewed, it became necessary to trace the history of *Certhilauda semitorquata* since the unrestricted nature of the type-locality made it impossible to establish to which population of this lark the name *C. semitorquata* is really applicable. This led to a detailed study of Dr. Andrew Smith's movements about the area concerned during his historic journeys mainly in the 1830's. From the information gleaned it transpired that Smith described *C. semitorquata* no less than three times. His second description of 1836 is generally accepted to-day as the original one, whereas it was actually

described before, in 1833, in the *Proceedings of the S. African Institution*, which were not published separately but appeared at irregular intervals in the *South African Quarterly Journal*. Unfortunately, this 1833 description cannot be traced, and so it is possible that Smith's report to the Institution never got as far as being published in the *S.A. Quarterly Journal*. Smith's third description of *C. semitorquata* appeared in the monumental "*Illustrations of the Zoology of Southern Africa*" 1843 and is a much more detailed account than the 1836 one contained in the "*Report of the Expedition for exploring Central Africa*."

Despite a close examination of these reports, and the very comprehensive volumes covering Smith's activities written by Prof. P. R. Kirby, no conclusive proof exists of just where the original specimens were obtained. Nowhere in Smith's diaries does he refer to *C. semitorquata* and so recourse must be made to the wording of his descriptions and Kirby's maps of his travels. During his outward trip in 1834 from Graaff-Reinet via Colesberg, Smith unfortunately passed exactly along longitude 25° E. which means that if he collected birds while still in the Cape Province they could have been either *C.c. subcoronata* or *C.c. semitorquata*. However once over the Orange River he turned eastwards and here it is certain that he was within the range of *C.c. semitorquata*. On his return trip in 1835 he definitely passed through territory (Hopetown via Britstown to Graaff-Reinet) which could only have yielded specimens of *C.c. subcoronata*. It was no doubt from such specimens collected by him during this leg of his trip that led to his description of *C. subcoronata* in 1843.

Now from Smith's 1836 and 1843 descriptions of *C. semitorquata* we come across the words "rusty white" and "tawny white" to describe the ventral coloration while the words "indistinct brown lines" and "streaked with umber-brown" are used to describe the upper breast. Although "rusty white" is also used to describe the ventral coloration of *C. subcoronata* in the "Illustrations etc", the accompanying plate and description of this race clearly indicate a greater caudad spread of the "umber-brown" streaking characteristic of *C. subcoronata* as opposed to the virtual confinement of these dark markings to the upper breast in *C. semitorquata* as also shown by Smith in both plate and description. Then too the measurements as given by Smith reveal that the overall dimensions and size differences between *C. semitorquata* and *C. subcoronata* approximates closely with that as given in my formal description of the two races in this report. The above data places the bird described as *C. semitorquata* by Smith quite easily into group three of the Long-billed Lark.

To narrow the field down still further the words "rufous" and "intermediate between chestnut-brown and reddish orange" used by Smith to describe the upperside, quite clearly remove any possibilities of the bird being *C.c. algida*, besides which the range given in the 1843 description reads "Inhabits arid plains in the interior . . .". *C.c. algida* inhabits grassy hills not far from the coastal strip.

Although a perusal of the map of Smith's travels quite clearly took him to areas within the range of *C.c. transvaalensis* the fact that in his 1836 description he plainly states that the described bird "inhabits the eastern Province of the colony and the country immediately about the Orange River" reveals conclusively that the bird concerned could only have been *C.c. semitorquata* as this territory falls within the range of this race as we know it to-day.

The last question to be settled is whether there is any distinction between *C.c. semitorquata* as hereunder interpreted and *C.c. daviesi*. Bird skins from the following localities all agree in essential details with topotypes of *C.c. daviesi* from Matatiele:— Excelsior and Meadows (O.F.S.), Mamathes (Basutoland), Rossouw, Jamestown, Burghersdorp, Steynsburg, Cedarville, Glen Grey, Queenstown and Bathurst (eastern Cape), Qudeni, Dannhauser, Dundee and Dargle (Natal), and Wakkerstroom (Transvaal). The range covered by these localities conclusively indicates that the territory traversed by Smith in which he could have collected specimens of *C. semitorquata* combined with the area of distribution as given for *C.c. daviesi*, composes a region from where the available representative collection of bird

skins are all clearly members of one subspecies. *C.c. daviesi* therefore becomes a synonym of *C.c. semitorquata*. Selater (1930) also follows this arrangement, while Mackworth-Praed & Grant (1962) omit *C.c. daviesi* without comment. The matter of restricting the type-locality of *C.c. semitorquata* is not so easily resolved. In order that it might be in the eastern Cape and at the same time be on a point along Smith's route, Colesburg is suggested, although undesirable from the point of view of its being on the extreme periphery of the subspecies' range.

Long-billed Lark populations falling within group 3 can therefore be classified as follows:—

(a) ***Certhilauda curvirostris transvaalensis* Roberts**

Certhilauda semitorquata transvaalensis Roberts, 1936. *Ann. Transvaal Mus.*, 18 (3) : 261. Olifantshoek, Rustenburg dist., western Transvaal.

Description: Upperparts a clear rufous or brick red streaked with fuscous or umber to a much reduced extent, being virtually absent in some specimens. Small spots or streaks of the same colour adorn the upper breast of the underside. The ground colour of the underside is buffy, being a richer reddish brown over the breast and flanks, leaving only the mid-abdominal region and throat paler. There is much individual variation in the intensity of the ventral brown ground colour, also in the degree of development of the breast spotting or streaking. The neck band is not particularly prominent and is only slightly paler or greyer than the general dorsal coloration.

Measurements:

<i>Males:</i>	wing	101·0–107·0 (104·3) mm.	12 specimens
	tail	72·4– 79·0 (75·4) mm.	8 specimens
	bill	22·5– 27·6 (26·1) mm.	12 specimens
<i>Females:</i>	wing	92·0– 96·0 (93·7) mm.	6 specimens
	tail	64·9– 73·0 (69·3) mm.	4 specimens
	bill	20·9– 22·6 (21·9) mm.	5 specimens

Material: 21 specimens, comprising 2 from the Orange Free State (Bloemfontein and Fauresmith), 5 from Natal (Newcastle, Dundee and Dannhauser) and 14 from the Transvaal (Pretoria, Belfast, Carolina, Johannesburg and Wakkerstroom).

Range: Parts of the Transvaal and adjacent northern areas of Natal and northern, central and western Orange Free State. Localities are few and scattered.

(b) ***Certhilauda curvirostris semitorquata* Smith**

Certhilauda semitorquata A. Smith, 1836, *Rep. Exped. C. Africa*, p. 47: "Eastern Province of the Colony". Restricted to Colesburg, north-eastern Cape Province.
Synonym: *C.c. daviesi* Roberts, 1911. *Ann. Transvaal Mus.* 3 (2): 114: Matatiele, East Griqualand.

Description: Resembles *C.c. transvaalensis* but the umber streaking of the upperparts and the similar markings of the upper breast tend to be better developed in most specimens, those of the breast being bolder and more sagittate in shape. The flanks are also streaked in certain specimens and the throat is often paler. The dorsal rufescence is generally darker and duller, sometimes rather vinaceous or yellowish. Appears to be larger in some measurements than *C.c. transvaalensis* but the wings and especially the tail are prone to considerable abrasion so these differences could be somewhat misleading in spite of having rejected for measurements the particularly worn specimens.

Measurements:

Males: wing 103·0–110·0 (106·8) mm. 23 specimens
 tail 73·5– 80·8 (78·0) mm. 10 specimens
 bill 24·3– 28·9 (26·1) mm. 22 specimens

Females: wing 90·5– 96·5 (93·4) mm. 11 specimens
 tail 64·9– 69·8 (66·9) mm. 5 specimens
 bill 20·3– 22·9 (21·6) mm. 11 specimens

Material: 39 specimens from Natal (Dargle, Dannhauser, Dundee, Qudeni), Transvaal (Wakkerstroom), Orange Free State (Meadows & Excelsior) and eastern Cape (Cedarville, Matatiele, Rossouw, Jamestown, Burghersdorp, Steynsburg, Glen Grey, Queenstown and Bathurst). Also 2 specimens from Mamathes near Teyateyaneng, in Lesotho.

Range: Covers a wide territory from the central and north-eastern Cape, the adjacent south-eastern Orange Free State, north to Griqualand East, Lesotho, and the uplands of Natal north to Dundee just penetrating the Transvaal at Wakkerstroom.

Remarks: A good series of specimens from upper Natal reveals a fairly broad belt of overlap or intergradation between *C.c. transvaalensis* and *C.c. semitorquata* from about Dundee to Wakkerstroom (Transvaal). However, the two races are, on the whole, very similar and the differences are best seen in series. The close resemblance between the Bathurst and Burghersdorp specimens can probably be accounted for by virtue of the presence of similar karroid conditions linking Burghersdorp with the western limits of the Albany district; the latter and the Bathurst districts abutting against one another.

(c) *Certhilauda curvirostris algida* subsp. nov.

Type: Female, adult. Thomas River, Cathcart district, eastern Cape Province, 18th May 1964. In the collection of the East London Museum. E.L.M. No. 10735.

Description: Bears a superficial resemblance to *C.c. semitorquata* but differs markedly in its colder coloration throughout, having none of the warmer reddish hues of *C.c. semitorquata* or *C.c. transvaalensis*. Although the colour of the upperside also varies as in other races most specimens come close to Wood Brown (Pl. XL of Ridgway, 1912) with a cold grey overlay caused by the greyish apical fringes to the feathers. The shaft-streaks are a greyish sepia. The neck-band is paler, greyer and the whitish tipped feathers in this area are more conspicuous than that of *C.c. semitorquata*.

On the underside, *C.c. algida* is also paler, more greyish white with a distinct admixture of grey to the breast in some specimens. According to Ridgway the breast is about Pinkish Buff (Pl. XXIX) grading to Pale Pinkish Buff (same plate) on the throat and lower breast. The sagittate breast markings are darker and more prominent, while the dorsal streaking is also somewhat bolder. In coloration the sexes are similar but differ in size as follows:—

Measurements:

Males: wing 103·0–112·0 (107·0) mm. 8 specimens
 tail 75·2– 83·7 (78·7) mm. 8 specimens
 bill 24·3– 27·1 (26·0) mm. 7 specimens

Females: wing 87·0– 96·5 (93·5) mm. 6 specimens
 tail 65·3– 71·8 (69·0) mm. 5 specimens
 bill 21·0– 22·0 (21·5) mm. 5 specimens

Material: 12 specimens in fresh plumage from Thomas River, one from Peelton (King William's Town district) and one from Trappes Valley in the Bathurst district.

Measurements of the type: wing 107.5 mm., tail 79.4 mm., culmen (from base) 26.4 mm.

Range: At present only known from a limited portion of the south-east Cape Province, being restricted perhaps to the moister grassy hills not far from the coast and the adjacent mountains. Could well be found in similar stations in the Transkei. Replaced by *C.c. semitorquata* in the higher mountains of the far interior (i.e. bordering the Drakensberg) and the semi-karoo regions of the eastern Cape.

Remarks: Although the existence of a subspecies occupying this part of the eastern Cape is surprising, the specimens are so distinct that on dorsal coloration alone 100% separation from *C.c. semitorquata* was possible.

NOTE

A perusal of the mensural characters of the races of group 3 reveal a remarkably close similarity of bill length (measured from base) the averages not varying by more than 0.1 mm. in males. In the wing measurements (flattened) the averages are not more than 2.7 mm. apart varying from 104.3 to 107 mm. in males. However upon measuring male specimens just west of longitude 25° E. from Hanover, Philipstown, Graaff-Reinet etc. a marked difference was encountered in that the wings averaged out at 110.5 mm. and the bill length's average was as much as 2.6 mm. in excess of the largest average of any race of group 3. These larger birds known as *C.c. subcoronata* Smith are in turn very similar in size to other birds of the same species found to the south and west (*C.c. gilli* Roberts) and to *C.c. bradshawi* (Sharpe) found along the country bordering the lower Orange River and north into Great Namaqualand. These last mentioned three races therefore according to external characters and measurements clearly form a group of their own as outlined earlier in this report (Group 2). The same holds true for the races of Group 3. The Long-billed Lark could therefore be a possible candidate for the ranks of a superspecies when this matter has been settled from a nomenclatural point of view and when more material from the southern extremities of the species range is made available for study.

The actual measurements of a series of *C.c. subcoronata* from the areas mentioned above plus additional birds from Prieska, Griquatown, van Wyk's Vlei, Graaff-Reinet, Victoria West, De Aar, Deelfontein etc. are as follows:—

<i>Males:</i>	wing	108.5–113.5 (111.2) mm.	17 specimens
	tail	80.7– 89.9 (86.1) mm.	14 specimens
	bill	27.5– 30.9 (28.8) mm.	15 specimens
<i>Females:</i>	wing	97.5– 99.0 (98.2) mm.	2 specimens
	tail	75.7– 78.0 (76.8) mm.	2 specimens
	bill	22.7– 24.3 (23.5) mm.	2 specimens

The remarkable disparity in size between the sexes of the Long-billed Lark is quite conspicuous when specimens are laid out for inspection. It was also notable that males far outnumbered females in most series of the various races.

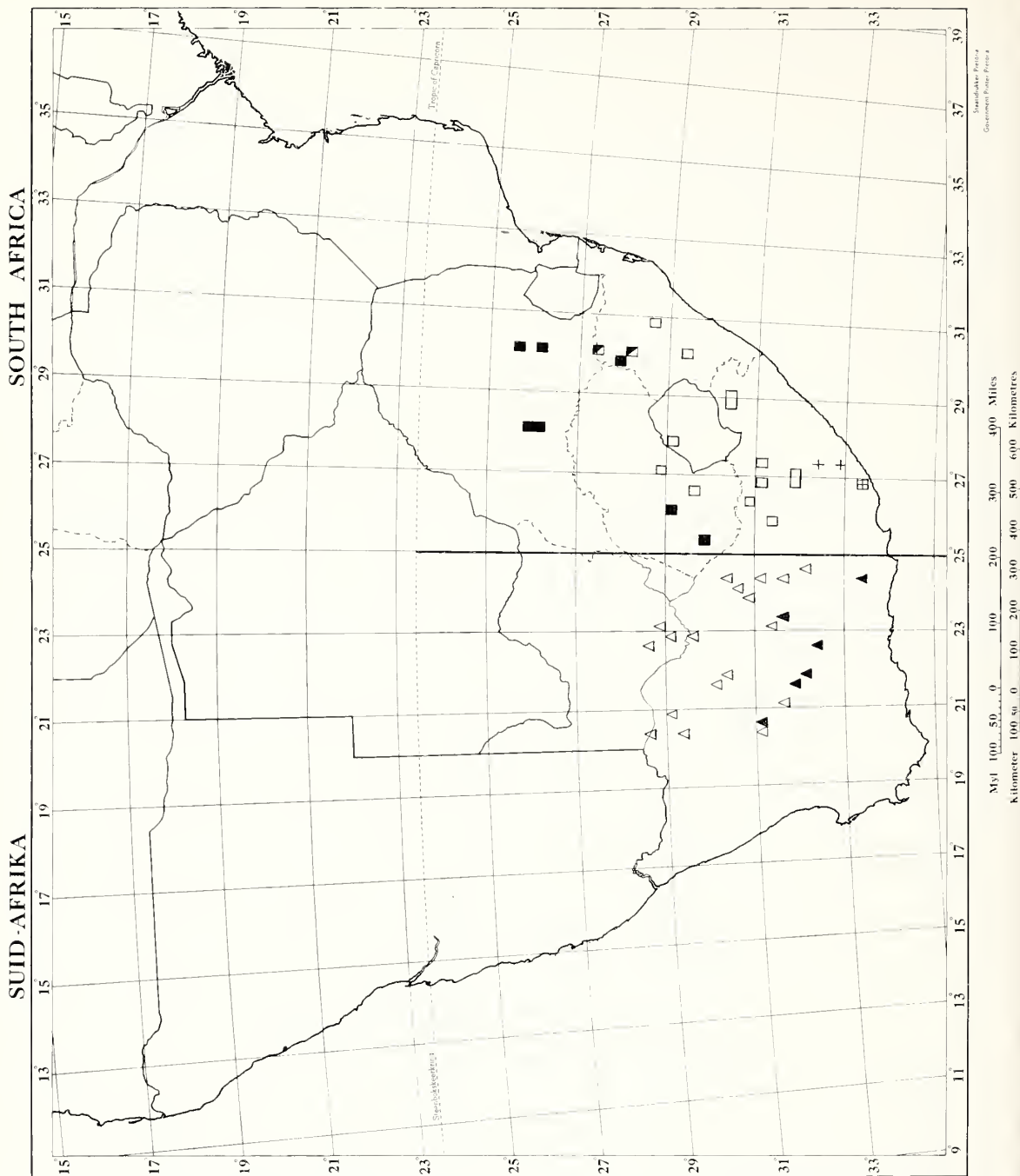
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Map of Southern Africa illustrating the grouping of races of *Certhilauda curvirostris* about long. 25° E. This meridian clearly divides group 2 (triangles) from group 3 (squares etc.).

Group 2 (a) Open triangles represent localities for *Certhilauda curvirostris subcoronata* Smith

(b) Solid triangles represent localities for *Certhilauda curvirostris gilli* Roberts

Group 3 (a) Solid squares represent localities for *Certhilauda curvirostris transvaalensis* Roberts

(b) Open squares represent localities for *Certhilauda curvirostris semitorquata*. Smith

(c) Crosses represent localities for *Certhilauda curvirostris algida*. Quickelberge

Combinations of symbols represent points where two races have been found to occur within the same area covered by the symbol.

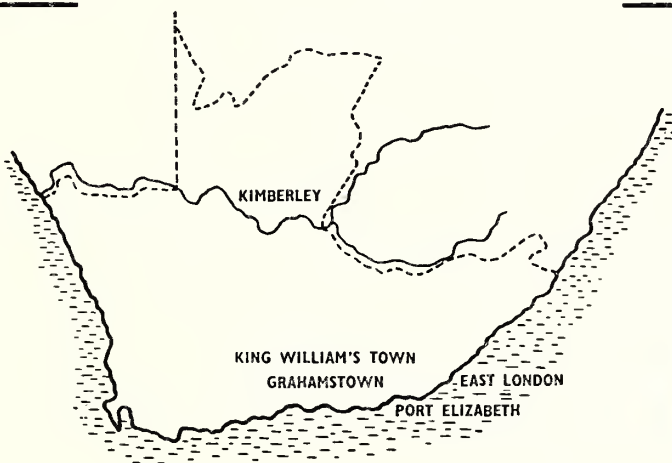
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A systematic revision of the Tchagra Shrike

by

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The endemic Red-winged Tchagra Shrike, *Tchagra tchagra* (Vieillot) has revealed, during a recent study of its constituent populations, a rich field of study from the taxonomist's viewpoint.

Formerly all that had been recorded in this respect was that two birds from Natal were found by Reichenow in 1903 to be atypical of the rest of the available material and so were tentatively described as a new variety. His suggestion that further study would be required to confirm the discreteness of this form has apparently not been followed up and the validity of var. *natalensis* has never since been questioned but invariably accepted by workers as a second subspecies.

Had the bird itself been at all common in the more northerly reaches of its range, such an investigation might well have been prompted but although quite plentiful from the south-west Cape up to the Great Kei River, it becomes sparse over the Transkei, Pondoland, Natal, Zululand and Swaziland. From the Transvaal there are sporadic but still unconfirmed reports of its presence. Such a diminution in numbers northwards is likewise demonstrated in the available series of skins borrowed from various South African museums. The assembled series comprised 25 skins from the western and southern Cape, 48 from the eastern Cape to the Kei valley, 6 from the Transkeian territories and Pondoland, 9 from Natal, and one each from both Zululand and Swaziland.

GEOGRAPHICAL VARIATION

This revision was initially prompted by the recent acquisition of a series of birds from the Little Karroo which were found to be decidedly grayer ventrally, somewhat colder dorsally and longer billed than their counterparts from the eastern Cape and Natal. Borrowed skins from other parts of the southern and western sectors of the Cape Province revealed that this form with slight divergence and individual variation also inhabits most of the country from about the Caledon district eastwards to Uitenhage. From the latter district eastwards a marked shift in the structural and colour facies of the Tchagra Shrike becomes apparent, but although birds from the Fish River valley in the eastern Cape could be regarded as another subspecies, further accentuation of these changes is progressive in a north-easterly direction, so that birds of the Kei valley are still more strikingly differentiated. These east Cape birds are shorter billed, warmer rufous over the upperparts and lighter ventrally. Another prominent feature is the pronounced olive wash to the flanks. Although birds of the Transkei and Pondoland are even redder dorsally and more heavily washed with olive over the thighs, flanks and under tail-coverts, these were considered best grouped with the other eastern Cape populations. It is only upon reaching Natal that another marked stepping in the observed character gradients occurs. Again the beak becomes noticeably shorter, but, also not unexpectedly, the bird itself is substantially smaller as revealed by the wing-measurements. There is, in addition, a further suppression and lightening of ventral grey and the development of a more prominent white abdominal patch. Dorsally the rufous is even warmer.

From these studies it is evident that not only is Reichenow's var. *natalensis* a good subspecies, but birds from Grahamstown eastwards to the borders of Natal are also clearly demarcated from their contiguous populations and require a name of their own. For this new race the name *Tchagra tchagra caffrariae* is proposed as being descriptive of its range.

NOMENCLATURE

Stark & Sclater (1901) state that Levaillant first found this species in the Humansdorp district, but Vieillot, in 1816, actually named it from the Gamtoos River. Recently obtained topotypical material from a locality near the Gamtoos River in the rain-shadow of the Winterhoek mountains was found to be similar to all the birds occurring to the west of this point. This western assemblage of populations, therefore, constitutes the nominate race.

Consideration was given to the name *Tchagra tchagra pondoensis* which appeared in a check list of birds of Port St. Johns by Winterbottom & Hare (1947). However as no description can be found it must be considered a *lapsus calami* for *T.t. natalensis* and thus unavailable for the new eastern Cape race.

TAXONOMIC CHARACTERS

As this species is particularly common in valley bushveld vegetation of the eastern Cape a good representative series of specimens is available. This has permitted the viewing of a clear picture of the bird's transitional stages in its character metamorphosis from the nominate race to the one inhabiting the eastern Cape viz. *T.t. caffrariae*.

The characters involved in this genetic shift from one subspecies to another are:—

1. Reduction of bill length,
2. warmth of dorsal rufescence,
3. degree of olive washing to flanks and
4. degree of departure from a dark pure ventral grey to lighter tints of grey including an accentuation in the development of the whitish abdominal feathering.

The above characters become more accentuated in a north-easterly direction in successive series of populations from various localities. The interesting part is to see how the steps in the levels of character change vary for each character or combination of characters.

Thus a study of a series of specimens from Uitenhage showed that characters 1 and 4 are the first to be affected to some extent. Characters 2 and 3 only start becoming visibly changed in a good series from the Fish River valley at Committees, Albany district. In the same series characters 1 and 4 have already, with few exceptions, reached a stage of modification which could be considered typical of *T.t. caffrariae*. Proceeding yet further north-eastwards, an ample series of skins from the Kei River valley reveals clearly that all the characters concerned have evolved to the level typical for the new eastern Cape race. It should be pointed out that various other specimens from points between the Fish and Kei rivers are close enough to rank as members of *T.t. caffrariae*. Even the Fish River birds are sufficiently transformed to be grouped under this race. Intergrading populations occur really only about the Uitenhage and western Albany districts.

It is appreciated that the above picture of such taxonomic changes in east Cape populations of the *Tchagra* could represent only the merest approximation to what the position over the

area as a whole really is. Any such discrepancy could stem from much interdigitation of various populations over the full width of the belt of the species' largely littoral disposition. For example limited material suggests that the birds from the Patensie area (Humansdorp district) are somewhat paler below and rather more olive-flanked than Uitenhage birds. Another possible complicating factor would be the extent of local and seasonal movements of the birds about a comparatively small section of country. However, judging from the Tchagra's habits and physical proportions it would not be expected that it would be given to much extensive local migration.

Thus it will have been noticed that characters (1 and 4) and (2 and 3) were more or less associated together in the character shift between the nominate race and *T.t. caffrariae*, the latter character combination appearing last. It could well be entirely fortuitous that this arrangement occurred and that each character change could in other subspecies proceed quite independently of any others. Another consideration is that if each such taxonomic character is indeed genetically independent of any one or more others, then we should find that each could proceed at a different rate of transformation. This appears to be borne out by the fact that character 2, although clinal from south-west to north-east, was found in the Tchagra Shrike to change the slowest of all so that although a reddening of the backs of some specimens is already foreshadowed in the nominate race, even the Natal birds are not all consistently warmer but a few examples are still as cold and brown as any typical specimen of the western Cape. It is merely that the race *T.t. caffrariae* contains more individuals with redder backs than is the case with specimens of the nominate subspecies, while in *T.t. natalensis* there are again more individuals with even redder backs than is found among individuals of *T.t. caffrariae*. In contrast to this, character 3 is virtually non-existent in the nominate race, reaching a peak in Pondoland examples of *T.t. caffrariae* and again diminishing somewhat in *T.t. natalensis*. Character 4, moreover, exhibits a slightly different pattern in that it is more even in its clinal change and also more complete in covering all individuals. Thus Natal birds are all consistently lighter below, showing none of the dark greyness so typical of members of the nominate race.

The foregoing are merely some examples that hint at the complexity that could underlie supposedly simple and orthodox geographical variation. This appears to be supported in some measure by the following statement made by Miller (1941) in his discussion of speciation in the genus *Junco* "... there are many independent geographic gradients in characters that run in different directions through the area". It could well be that this statement has a wider application than that for which it was intended and that not only could geographic character gradients run independently of each other through an area but that these gradients need not necessarily all proceed at the same regular or smooth degrees of change. It is not intended that this discussion be regarded as an argument against the concept of the subspecies but rather to draw attention to the pitfalls and possible reasons for so much of the disagreement among taxonomists especially at infraspecific levels.

TAXONOMIC ARRANGEMENT

1. *Tchagra tchagra tchagra* (Vieillot)

Thamnophilus tchagra Vieillot, 1816. N. Dict. d'Hist. Nat. 3: 317. Gamtoos River, eastern Cape Province, ex Levaillant.

Description: Sexes similar in plumage. On upperparts, the crown varies least in colour, being a dull dark reddish-brown. The rest of the dorsal surface is variable, but generally dark olive, overlaid to a greater or lesser extent by the head-top colour. In specimens with a purer

olive back, the crown colour is sharply contrasted, otherwise the colour of the head-top fades imperceptibly into the general mantle coloration. Lighter tints of olive are often located about the hind neck and towards the sides. Superciliary stripe off-white.

The underside is a fairly dark ash-grey, paler abdominally, and with a whitish throat. Over the flanks there are usually traces of an olive wash, but in most specimens this is hardly noticeable.

Variation within this race affects the ventral colouring, in that some coastal birds are not as pure a grey as all inland examples but acquire a faint wash of a dull pinky vinaceous. This could be attributable to soil staining. In this race the bill attains its maximum size and is often strongly hooked.

Measurements:

Males: wing 82·2–87·5 (84·3) mm. 9 specimens
tail 91·2–96·7 (94·3) mm. 4 specimens
culmen 28·1–34·4 (31·26) mm. 9 specimens

Females: wing 79·0–87·0 (82·2) mm. 13 specimens
tail 87·7–98·8 (90·4) mm. 8 specimens
culmen 28·1–32·0 (30·07) mm. 13 specimens

Material examined: Hermanus 1, Zoetendalsvlei 1, Robertson 2, Sevenweeks Poort 1, Calitzdorp 1, Still Bay 6, Swellendam 2, Oudtshoorn 2, Klaarstroom 2, Knysna 3, Willowmore 1, Steytlerville 1, Uitenhage 2. Total 25.

Range: Generally listed as occurring no further west than Hermanus but recent check lists suggest that it penetrates quite far into the western Cape, *vidé* Lists of the Birds of the Worcester (1962) and Clanwilliam (1963) districts by Prof. J. M. Winterbottom. Eastwards this race continues along the coast and Little Karroo up to the western limits of the Uitenhage district; also sparingly penetrates the Great Karroo.

2. *Tchagra tchagra cafrariae* subsp. nov.

Type: Female, adult. Bolo-Kei Bridge, Stutterheim district, eastern Cape Province. 2nd April 1965. In the collection of the East London museum. E.L. Mus. No. 11200.

Description: Crown warmer than that of the nominate race, having a more reddish hue, this a somewhat richer shade than Ridgway's Auburn (Pl. II, 1912). The colour of the crown also invades and brightens the upperparts of the body, but there is some variation and other specimens are again more olive over the mantle. The warmer dorsal coloration is correlated with an invasion of the whitish superciliary stripes by light buff, as well as a marked increase in the olive wash to the flanks, under tail-coverts and thighs, so that this character is now a prominent feature. Over rest of underparts, the pure grey of the nominate race is replaced by lighter tints, the belly now assuming a distinct whitish patch. The breast feathers are often faintly tinged with olive. The wing-coverts do not vary to any marked degree and are generally a vinous-chestnut.

Similar in size to the nominate race, although males average smaller.

The culmen length is noticeably shorter in both males and females averaging up to 2·5 mm. less in males. The culmen height (measured at nostrils) however remains unchanged.

Measurements:

Males: wing 79·5–84·5 (82·0) mm. 14 specimens
 tail 88·5–94·7 (91·9) mm. 10 specimens
 culmen 26·6–30·9 (28·7) mm. 13 specimens

Females: wing 78·5–86·0 (82·1) mm. 22 specimens
 tail 87·8–97·0 (92·5) mm. 18 specimens
 culmen 26·7–30·0 (28·3) mm. 21 specimens

Material examined: Committees Drift 16, Kei Valley 17, King William's Town 5, Peddie 2, Debe Nek 3, Gqunge 1, Port St Johns 4, Total 48.

Measurements of the type: culmen (from base) 28·7 mm.
 tail 93·9 mm.
 wing (flattened) 84·0 mm.

Range: Occurs from the Fish River in the eastern Cape, eastwards to the approaches of Natal.

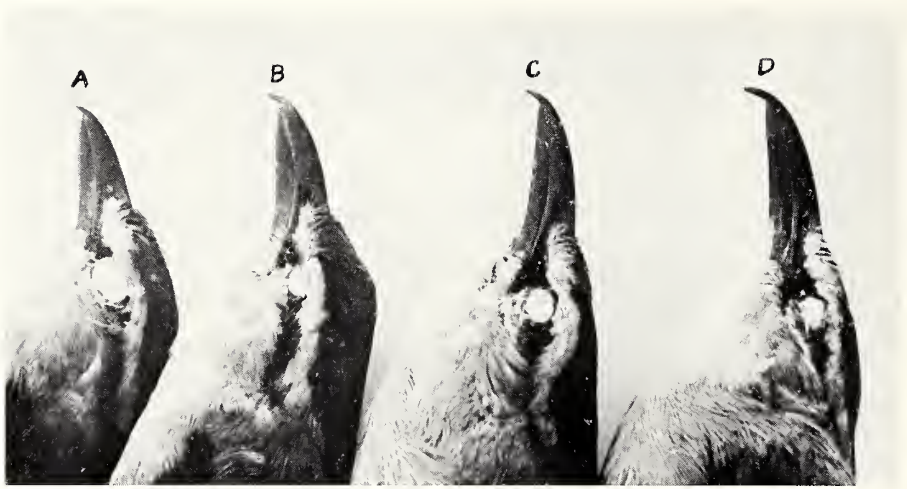
Remarks: To the west of its range *T.t. caffrariae* intergrades with the nominate race in and around the Uitenhage district while a single specimen from Embotyi which closely resembles *T.t. natalensis* would appear to indicate a zone of intergradation with *T.t. natalensis* towards the approaches of the Natal border. Although the four Port St. Johns birds exhibit some genetic shift in characters towards those of *T.t. natalensis* especially in the redder upperparts, they are in size, etc., closer to the eastern Cape race.

3. *Tchagra tchagra natalensis* (Reichenow)

Pomatorhynchus tchagra var. *natalensis* Reichenow, 1903. Vog. Afr., 2: 544. Umgeni R., Durban, Natal.

Description: In plumage coloration this race merely carries the character shift displayed by *T.t. caffrariae* a step further with the dorsal colours again exhibiting most variability. Ventrally *T.t. natalensis* has none of the particular rich ashy grey colour associated with the nominate race or even *T.t. caffrariae* to a lesser extent, but displays various lighter hues of grey. The sole exception in this clinal pattern of colour change is the olive washing to the flanks which in *T.t. natalensis* diminishes somewhat in extent especially if compared with Pondoland birds.

In mensural characters there is a difference in overall size and culmen length, these being noticeably smaller in *T.t. natalensis* as compared with *T.t. caffrariae*. The culmen although being as much as 3 mm. shorter than *T.t. tchagra* and 1 mm. shorter than *T.t. caffrariae* (i.e. in combined male and female averages) is again not smaller in height. This gives the bill of *T.t. natalensis* a more robust appearance when viewed laterally. This structure is also not as hooked as in the nominate race. (See Figs. 1 & 2.)



EXPLANATION OF FIGURES

Figs. 1 and 2 are designed to depict the differences between the three races of *Tchagra tchagra*. The birds of Fig. 1 show a lateral view of the heads of the races while the same specimens in the same order are shown in ventral view in Fig. 2. The races are numbered thus:

- A. *T.t. natalensis* (Reichenow)
- B. *T.t. caffrariae* Quickelberge
- C. *T.t. tchagra* (Vieillot)
- D. *T.t. tchagra* (Vieillot)

Specimen D. is an extreme example of bill development in the nominate race. The others are average specimens.

Fig. 1. clearly illustrates the striking changes in the configuration of the bill from north-east to south-west. This involves only a lengthening of the bill while its height remains virtually unchanged.

Fig. 2 is intended to illustrate some of the plumage differences between the races, thus specimens C. and D. are dark grey with a minimal amount of belly white. Specimen B. is somewhat lighter showing more mid-abdominal white, while specimen A. is even paler below with a still more prominent abdominal white patch while the overall size difference is also obvious.

Measurements:

<i>Males:</i>	wing	76·5–81·0 (79·5)	mm. 8 specimens
	tail	83·6–90·3 (86·8)	mm. 5 specimens
	culmen	26·2–28·4 (27·35)	mm. 7 specimens
<i>Females:</i>	wing	77·5–80·5 (79·0)	mm. 2 specimens
	tail	82·2–90·7 (86·7)	mm. 2 specimens
	culmen	27·0–29·6 (28·3)	mm. 2 specimens

Material examined: Embotyi (Pondoland) 1, Umgeni River (Natal) 1, Durban 1, Mount Edgecombe 2, Umhlanga Rocks 3, Shongweni 2, Ingwavuma (Zululand) 1, Indhlovodwalilie (West Swaziland) 1. Total 12.

Range: From the south-western borders of Natal, north-eastwards to include most of midland and coastal Natal, Zululand and parts of Swaziland. Probably also sparingly penetrates the Transvaal lowveld as it was recorded by Calder (1948) in his notes of the birds of the Kruger National Park, in which he states that a specimen was seen north of Shingwedzi. A still more interesting extension of range is claimed for *Tchagra tchagra* in a list of the birds of the Percy Fyfe Nature Reserve 23 miles north of Potgietersrust by van der Merwe and Pienaar (1959).

Remarks: Any definite verdict on the racial affinities of Transvaal birds will have to remain in abeyance until such time as specimens are produced for study. Intergradation with *T.t. caffrariae* judging only from a single sub adult specimen from Embotyi probably occurs towards the approaches of the Natal border in eastern Pondoland.

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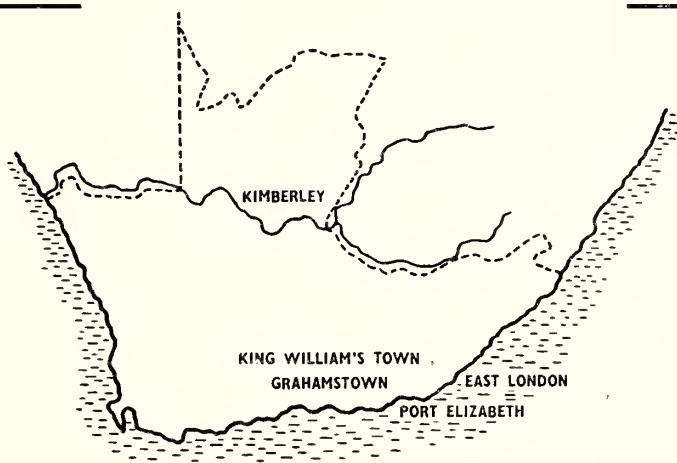
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Phyllocladopitys aus den Karruschichten von Barkly West, Südafrika

von

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Naturmuseum Senckenberg, Frankfurt am Main.

Im Nachlaß von R. Kräusel befand sich unter den fossilen Hölzern ein Stück, welches ihm freundlicherweise von Dr. Fock vom McGregor Memorial Museum, Kimberley, zur Verfügung gestellt worden war. Bei einer gemeinsamen Betrachtung war bereits festgestellt worden, daß die Beschreibung dieses Stückes von Bedeutung sein könnte, und ich entschloß mich daher, die von R. Kräusel begonnene Bearbeitung fortzuführen. Einige Notizen und ein erster Entwurf der Beschreibung des Fundstückes gaben mir dafür wertvolle Anhaltspunkte. Es war notwendig, die Schliffe mit solchen zu vergleichen, die bereits von dieser Pflanzengruppe aus Südafrika beschrieben worden waren, und ich möchte Herrn Prof. Dr. Daber von der Deutschen Akademie der Wissenschaften, Berlin, für die leihweise Überlassung einer großen Serie Originalschliffe von *Phyllocladoxylon* und *Phyllocladopitys* an dieser Stelle meinen besten Dank aussprechen. Desgleichen danke ich auch herzlich Herrn Dipl. Geol. Thomas Reimer für die Ratschläge und freundliche Unterstützung bei der Beschaffung von Literatur über die Geologie Südafrikas.

Nach schriftlicher Mitteilung von Dr. Fock stammt das Stück aus der Diamantmine Du Plessis Diamonds auf der Farm Doornkloof, die etwa 35 km von Barkly West gelegen ist. Weiterhin schreibt Dr. Fock in einem Brief am 25.2.64: „Der fossile Baum liegt 446 Fuß unter der Oberfläche in Schiefer und zwar vom Schacht etwa 50° nach Norden geneigt. Die Länge des Stammes beträgt 5 m. Wurzeln sind nur als Abdrücke sichtbar geworden. Die Äste (Zweige) lagen nicht flach auf dem Boden, sondern machten den Eindruck eines noch stehenden (wenn auch schiefen) Baumes“.

Es wäre sehr zu wünschen, wenn man noch Teile der Äste sicherstellen könnte, denn dieser Stamm ist der erste, den man mit wirklich erhaltenen Zweigen gefunden hat.

Das Profil der Fundstelle ist nach den von Dr. Fock mitgeteilten Angaben des Obersteigers der Mine folgendes:

Von der Oberfläche bis 312 Fuß: Schwarzer Schiefer

18 Fuß: Dolerit

241 Fuß: Schwarzer Schiefer

Liegendes: Ventersdorper Diabas

Der Baunstamm lag nach Angaben des Obersteigers 125 Fuss über dem Ventersdorper Diabas in schwarzem Schiefer, also genau 446 Fuss tief im Boden.

Bei dem schwarzen Schiefer handelt es sich laut Mitteilung des Chefgeologen der De Beer's Mining Corporation, Herrn Hallam, um schwarzen Dwyka Schiefer.

Nach der Gliederung der Karruformation von Du Toit (1954) sind die Schichten der Dwyka Serie die untersten der Karruformation und werden folgendermaßen unterteilt:

Maximale Mächtigkeit im Kapland

Upper Shales	650 Fuß
Boulder Beds (Tillite).	2,500 Fuß
Lower Shales	750 Fuß

Wie ich aus einer Skizze der möglichen Paläogeographie der späteren Dwykazeit entnehmen konnte (Hamilton & Cooke 1960, S. 330), begannen in dieser Zeit die Gletscher der nördlichen Hochländer zu schmelzen und eine Flachwasserbildung (Shallow Water) breitete sich nordwärts in die vom Eise befreiten und erodierten Gebiete aus. In den Schichten dieses ehemaligen Shallow Water-Gebietes befindet sich unser Fundort.

HERSTELLUNG DER ÄTZFILME.

Zur mikroskopischen Untersuchung wurden neben den üblichen Dünnschliffen auch Ätzfilme herangezogen. Bei deren Herstellung wurde folgendermaßen verfahren: Das Stück wurde angeschliffen (Körnung 500). Die angeschliffene Fläche wurde durch Eintauchen in 5% ige Salzsäure (20 Sekunden) und in ca. 15% ige Flußsäure (ca. 30 Minuten) angeätzt. Dann wurde ausreichend mit Wasser gespült, wobei das Berühren der geätzten Fläche zu vermeiden ist. Nun wurde die Ätzfläche im warmen Luftstrom getrocknet und das Stück auf Plastilin, mit der Anschliff-Fläche nach oben, möglichst waagrecht aufgesetzt. Sobald die Oberfläche „zimmertrocken“ war wurde mit reichlich Aceton übergossen, mit einer Pipette laufend Aceton auf die Fläche gespritzt und dabei von der Seite her vorsichtig aber rasch eine Acetatfolie aufgerollt, (Stärke 0,2 mm, von der Firma Kalle & Co., Wiesbaden). Hierbei darf der Film nicht mehr verrutschen und die Bildung von Luftblasen muß vermieden werden. Die Folie wurde nun mit dem Handballen gut angepreßt und so ca. 5 Minuten lang unter leichtem Druck gehalten, so daß der Film anziehen konnte, was an einer leichten Wellung der Oberfläche zu erkennen war. Dann wurde der Film vorsichtig vom Rande her abgezogen. Da jetzt die Folie zum Einrollen neigte, wurde sie für kurze Zeit bis zum Einbetten in Wasser gelegt. Die Einbettung erfolgte in Glyceringelatine auf einer Glasplatte, die mit einer starren Celluloidfolie bedeckt wurde. Unter leichtem Druck konnte nun das Präparat langsam erkalten.

BESCHREIBUNG DES STÜCKES.

Es liegt ein 9 cm hohes Bruchstück eines runden Stammes vor mit einem Durchmesser von etwa 8–9 cm, deutlich differenziert in Mark- und Holzteil. Der innere runde, schwarze Teil mit einem Durchmesser von 3 cm hebt sich schon auf dem Querbruch deutlich von dem äußeren ab. Außen sitzen an einer Stelle noch Gesteinsreste, schwarzgrau, matt glänzend, von muscheligen Bruch, eine Art Tonschiefer und verhältnismäßig schwer. Der Holzteil ist kalkhaltig, während sein Mark verkieselt ist. Dieser Unterschied in der mineralischen Substanz wurde erst beim Anätzen festgestellt. Danach erschien das Mark viel heller als das Holz (S. 000, Taf. 1, Fig. 1).

Das Gewebe des Markes hat sich offenbar zusammengezogen, wobei das innerste Holz teilweise in einer unregelmäßigen Dicke von 2–4 mm mitgerissen wurde. Dabei wurde es durch einen unvollständigen ringförmigen Riß vom äußeren Holz getrennt.

Das Mark ist gut erhalten. Seine Zellen sind auf dem Querschnitt sehr unregelmäßig gestaltet, oft \pm rundlich, die äußersten Zellen noch fest mit den ersten Holzzellen zusammenhängend. Hier werden die Markzellen erheblich kleiner als im inneren Markraum und sind radial verlängert, so daß ihr Querschnitt länglich bis oval ist. Dabei ordnen sie sich zu Reihen, die radial auf die keilförmig in das Mark hineinragenden Holzteile hinlaufen (Abb. 2, Taf. 1, Fig. 2–3). Die inneren Markzellen sind auf dem Längsschnitt kaum höher als breit, aber unregelmäßig gestaltet und ungeordnet, während die äußeren länger werden. Auf der radialen Wandung tragen sie breit-ovale, in den Endteilen auch zugespitzte, seltener abgerundete Tüpfel.

Im Inneren des Markes erkennt man schon mit freiem Auge dunkle, 2–3 mm große Flecken (Taf. 2, Fig. 2). Sie sind unregelmäßig im Mark verstreut. Ihr Abstand beträgt \pm 5–6

mm, einmal auch nur 2 mm. Es sind knotenartige Zellgruppen, deren innere Wände zum Teil zerstört sind. Im inneren Raum ist vermutlich eine dunkle Substanz ausgeschieden worden. Die äußeren, kleineren Zellen sind entsprechend der Gestalt des Knotens gedehnt, so daß sie ihn unregelmäßig-rundlich, aber deutlich gegen das normale Gewebe abgrenzen.

Über die Natur der dunklen Substanz und die Entstehung der knotenartigen Zellgruppen kann man an Hand des einzigen hier vorliegenden Stückes wenig aussagen. Es besteht die

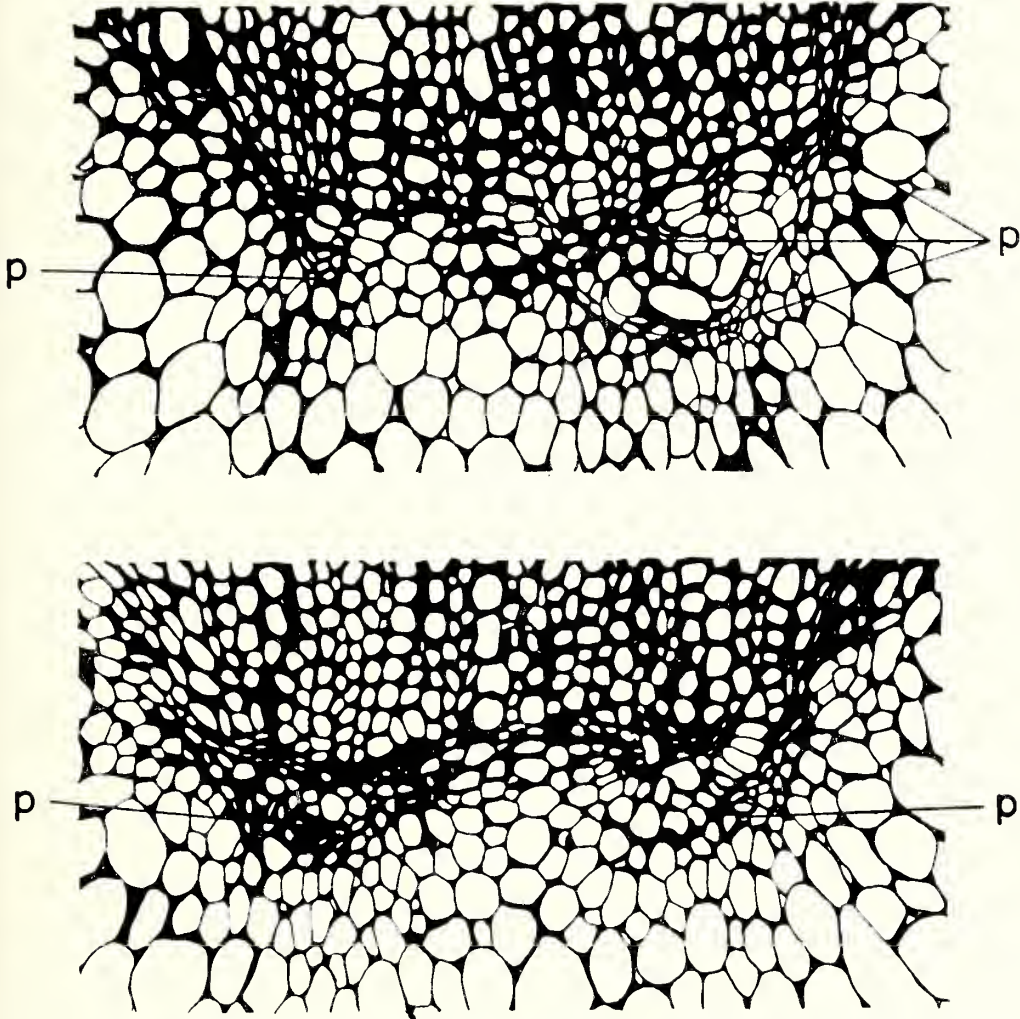


Abb. 1. u. 2. *Phyllocladopitys* cf. *capensis* Kräusel. Querschnitt des Markes, oben mit zwei sekundären Holzkeilen; vor diesen, z.T. durch Markzellen vom übrigen Holz getrennt, bei „p“ das Protoxylem. Dieses in Gruppen und in bogenförmiger Anordnung gegen das Mark vorstoßend. Vergrößerung 100 \times .

Möglichkeit einer Ablagerung anorganischer Stoffe bei der Fossilisation oder während des Lebens (Infiltrationsknoten), was wir für sehr wahrscheinlich halten. Es kann aber auch eine krankhafte Bildung oder aber ein schizo-lysigener Sekretraum gewesen sein, in der Entstehung ähnlich den Harzräumen der Koniferen.

Das Holz springt keilförmig gegen das Mark vor und man erkennt deutlich die engblumigen Zellen des primären Holzes (Protoxylem Abb. 1). Aber auch markwärts von diesem liegt oft noch eine Gruppe unregelmäßig angeordneter kleiner Tracheiden, die, wie der Längsschnitt zeigt, Spiralverdickungen besitzen und mitunter durch eindringende Markzellen von dem übrigen Holzteil getrennt sind, beziehungsweise sich in mehrere Gruppen auflösen. (Taf. 2, Fig. 6.) Es ist also teils bogenförmiges, zuweilen \pm aufgelöstes, zentripetales Holz vorhanden (Abb. 2).

In radialer Richtung schließen sich die ersten sehr kleinen zentrifugalen Tracheiden des sekundären Holzes an. Sie besitzen im Frühholz zunächst ringförmige Verdickungsleisten. Die 2. oder 3. Reihe trägt bereits Treppentüpfel. Die Sprossen stehen zunächst sehr eng und der allmähliche Übergang zu hofgetüpfelten Tracheiden ist sehr gut zu verfolgen. Die Hof-tüpfel stehen oft in einer Reihe, sind dann meist rund, berühren sich oben gegenseitig und besitzen einen schrägspaltenförmigen Porus. Oft platten sie sich auch stark ab. Da sie fast die ganze Breite der Tracheidenwand einnehmen, sind sie erheblich breiter als hoch, mitunter fast rechteckig. Seltener stehen sie—meist streckenweise—auch zweireihig und platten sich dann mehr oder weniger „araucarioid“ ab. Mitunter sind sie fast gegenständig.

Stets sind die Tracheidenwände stark abgebaut und oft ist nur die Mittellamelle als strichdünne, dunkle Linie erhalten. Die Sekundärlamellen sind gequollen und durch Calcutauscheidung verengt, die höchstens einen kleinen, auf dem Querschnitt rundlichen, meist aber viereckigen Innenraum frei läßt. Es sind deutliche, ziemlich breite Zuwachszonen vorhanden. Mit der Lupe erkennt man auf 2,5 cm 8 Hauptzonen, zum Teil dazu aber noch feinere. Der innerste Holzring ist \pm 3 mm breit. Im Außenteil sinkt die Breite auf 1/2–1/3 der inneren Ringe. Die Zuwachszonen sind scharf begrenzt. Die Weiten der äußersten Zuwachszonen verhalten sich zu den innersten wie 1:6 bis 1:8. Das ergibt einen deutlichen Stammholzbau. (Taf. 1, Fig. 1).

Das Holz wird von nicht gerade häufigen, meistens ein-, selten auch zweireihigen, Markstrahlen durchzogen. Sie sind 1–10, meistens 2–5 Stockwerke hoch und schmaler als die Tracheiden. Auf dem Kreuzungsfeld tragen sie stets nur einen, meist schräg stehenden, großen Tüpfel. Im Spätholz sind diese \pm schräg, im Frühholz dagegen rund und elliptisch (Weite 9–30 μ). Meist sind sie freilich zerstört und erfüllen dann das ganze Kreuzungsfeld als heller, runder, schräg ovaler Fleck ohne sichtbaren Porus. Sie sehen dann wie große Eiporen aus, doch war es zuweilen ungewiß, ob solche wirklich vorhanden sind. Erst weitere Dünnschliffe und Ätzfilme zeigten diese „Eiporen“ deutlicher, insbesondere den Porus selbst, so daß wohl kein Zweifel mehr besteht, daß hier echte Eiporentüpfel vorhanden sind (Taf. 2, Fig. 4 u. 5).

GEGÜBERSTELLUNG DES FUNDSTÜCKES MIT *PHYLLOCLADOPITYS* CAPENSIS KRÄUSEL UND *PHYLLOCLADOXYLON* CAPENSE WALTON.

Bei der Aufstellung seiner Gattung *Phyllocladopitys* verglich Kräusel sein Fundstück mit *Phyllocladoxylon capense* Walton und kam dabei zu folgender Gegenüberstellung (Kräusel in Kräusel & Range 1928:38):

„1. *Phyllocladopitys capensis* Kräusel.

Mark homogen, ohne Steinzellen, das zentripetale Primärholz gegen das Mark vorspringend und zuweilen vom übrigen Holz isoliert. Sekundärholz zentrifugal, mit deutlichen Zuwachszonen, aus Tracheiden aufgebaut. Erste Tracheiden mit Spiralverdickungen, spätere

mit Treppen-, Netz- und schließlich Hoftüpfeln. Hoftüpfel meist nur auf den radialen Wänden „araucarioid“ bis opponiert geordnet, mit schräg spaltenförmigen Porus. Markstrahlen meist einschichtig 1–18 Stockwerke hoch, glattwandig, mit je einer, sehr selten zwei großen, elliptischen Eiporen im Felde, die im Spätholz schräg, im Frühholz horizontal stehen (aus Kräusel & Range 1928: S. 38)“.

„2. *Phyllocladoxylon capense* Walton.

Stimmt mit dem sekundären Holz von *Phyllocladopitys* vollständig überein (Walton 1925). Dennoch ist es nicht angängig, die beiden Fossilien ohne weiteres zu vereinigen, nachdem wir wissen, daß große Eiporen verschiedenen Gymnospermen zukommen. Es ist eben nicht möglich, diese eindeutig zu bestimmen, solange man nur das sekundäre Holz kennt, und in diesem Falle ist die Bezeichnung *Phyllocladoxylon* durchaus am Platze, wenn auch vermutet werden kann, daß *Phyllocladoxylon capense* zu *Phyllocladopitys* gehört.“ (Kräusel in Kräusel–Range 1928.)

VERGLEICH DES VORLIEGENDEN FUNDSTÜCKES MIT DEN BEIDEN VORANGEHENDEN BESCHREIBUNGEN.

a. Mark: \pm parenchymatisch; im äußeren Teil des Markes ordnen sich die Markzellen zu Reihen, die radial auf die keilförmig in das Mark hineinragenden Holzteile hinlaufen.

Im Inneren des Markes unregelmäßig verstreute, dunkle Flecken, die knotenartige Zellgruppen darstellen, deren innere Wände zum Teil zerstört sind. Dabei ist im inneren Raum eine dunkle Substanz ausgeschieden worden („Infiltrationsknoten“).

b. Hinweise auf Zentripetalholz sind gegeben durch die einfach getüpfelten Grenzzellen des Markes. (Marktracheiden). Aber auch markwärts von diesem Primärholz liegt oft noch eine Gruppe unregelmäßig angeordneter kleiner Tracheiden, die Spiralverdickungen besitzen und mitunter durch eindringende Markzellen vom übrigen Holzteil getrennt sind. Im ganzen ergibt sich das Vorhandensein, zuweilen \pm aufgelöster, zentripetaler Holzteile.

c. In radialer Richtung schließen sich die ersten sehr kleinen zentrifugalen Tracheiden des Sekundärholzes an. Ihre Hoftüpfel sind erheblich breiter als hoch, mitunter fast rechteckig. Teilweise stehen sie zweireihig und platten sich dann \pm „araucarioid“ ab. Mitunter sind sie auch fast gegenständig.

d. Auf dem Kreuzfeld trifft man stets nur einen meist schräg stehenden großen Tüpfel an. Im Spätholz sind diese Tüpfel \pm schräg, im Frühholz dagegen rund oder elliptisch (9–30 μ) weit.

Die Gegenüberstellung zeigt, daß das Fundstück mit den bei *Phyllocladopitys* gemachten Angaben im wesentlichen übereinstimmt. Nur eine Besonderheit zeigt sich in der Struktur des Markes, die schon erwähnten unregelmäßig im Mark verstreuten Flecke, die wir zunächst als knotenartige Zellgruppen, deren innere Wände zum Teil zerstört sind, angesprochen haben („Infiltrationsknoten“).

BESTIMMUNG.

Durch das Auftreten zentripetalen Holzes im Stamme und die Tracheidentüpfelung erweist sich das vorliegende Stück als eine Mesoxyloidee, deren Markstrahlenbau mit *Phyllocladopitys* übereinstimmt. Eiporen, die denen von *Phyllocladopitys* völlig gleichen, besitzen auch *Medulloxylon* und *Rhexoxylon*. Es wurde bereits betont, daß dieses Merkmal bei älteren Gymnospermen weiter verbreitet gewesen zu sein scheint, als bisher angenommen wurde. Aber weder *Medulloxylon* noch *Rhexoxylon* kommen hier für einen näheren Vergleich in Frage, da sie sich auch nach dem Bau des Sekundär-Holzes von *Phyllocladopitys* unterscheiden lassen.

Es handelt sich also bei dem vorliegenden Baumstamm um eine Gymnosperme der Gattung *Phyllocladopitys*, die mit *P. capensis* weitgehend identisch ist. Der einzige Unterschied besteht in den schon erwähnten markständigen Infiltrationsknoten. Da kaum anzunehmen ist, daß derartige Bildungen der Beobachtung von Walton und Kräusel entgangen sind, handelt es sich hier um ein Merkmal, das vielleicht einmal Anlaß zur Abtrennung einer neuen Art gibt. Es erscheint mir aber verfrüht, dies schon jetzt vorzunehmen, bevor nicht derartige „Anomalien“ im Mark durch wiederholte Beobachtung eindeutig geklärt worden sind.

SUMMARY.

From the upper Dwyka section (Karoo) of the Barkly West district (South Africa) the remains of a tree trunk 5 m. in length were studied. Since the roots are only known from impressions they could not be examined. The anatomy of the trunk clearly shows that the tree belongs to a gymnospermous plant. Both the presence of centripetal wood and the pit-structure of the tracheids allow it to be placed in the Mesoxylodeae. This group is also characterised by a typical ray-structure as seen in a specimen which was used for comparison (Kr. 42). The latter, which was described by Kräusel as *Phyllocladopitys capensis*, agree in all essential characters with the plant in question. The pith in this specimen, however, is marked by irregularly distributed dark areas which are visible with the naked eye. Since this phenomenon has not been observed before, one cannot easily ascertain whether these spots represent groups of differentiated cells or simply crystallised inorganic substances. More material may elucidate the problem and, perhaps, show that it represents a new species of *Phyllocladopitys*.

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Fig. 1

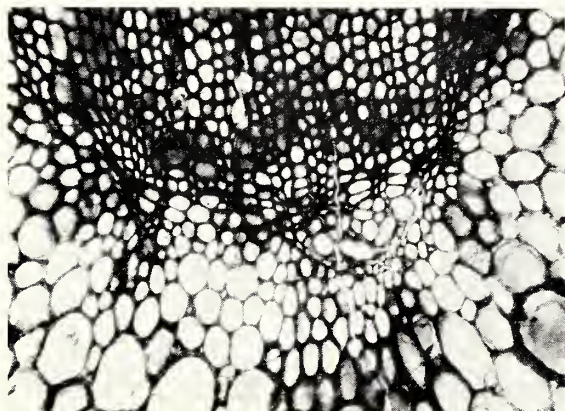


Fig. 2

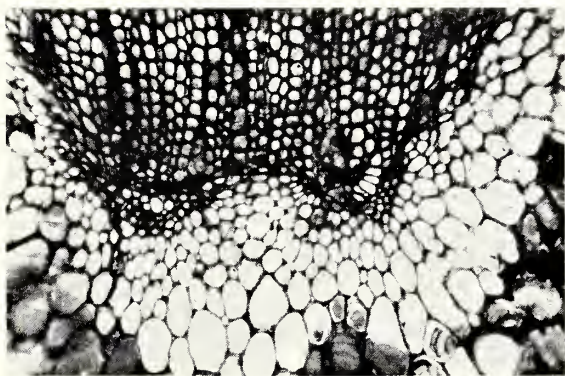


Fig. 3

Tafel 1.

Phyllocladopitys cf. *capensis* Kräusel SM. B 10735 a + b 1.-12.

Figur 1. Stammquerschnitt mit Salzsäure (HCl) und Fluorwasserstoffsäure (HF) geätzt. Das Mark durch Ätzung aufgehell. Verkleinerung 2/3.

Figur 2-3. Grenzzone zwischen sekundärem Holz und Mark, sonst wie bei Abb. 1. u. 2. Vergrößerung 65 ×.

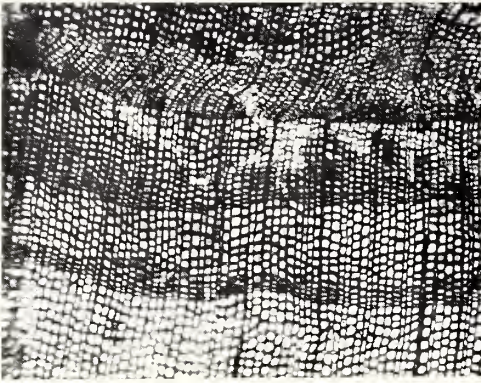


Fig. 1

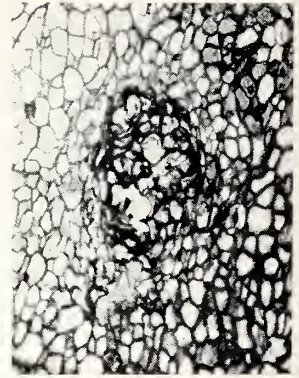


Fig. 2



Fig. 3

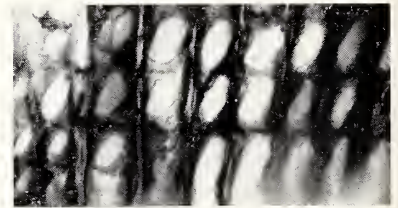


Fig. 4



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Fig. 6

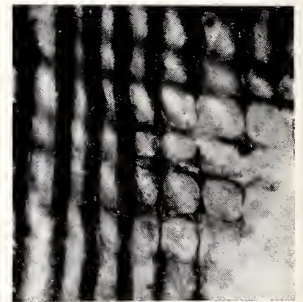


Fig. 5

Tafel 2.

Phyllocladopytis cf. *capensis* Kräusel SM. B 10735 a + b/1.-12.

Figur 1. Querschliff mit Zuwachszonen im sekundären Holz. Vergrößerung 65 ×.

Figur 2. Querschliff durch das Mark mit „Infiltrationsknoten“. Vergrößerung 20 ×.

Figur 3. Tangentialschliff durch das sekundäre Holz mit einreihigen Markstrahlen. Vergrößerung 65 ×.

Figur 4. Markstrahl aus dem Radialschliff des Spätholzes mit je einer großen Eipore auf dem Kreuzfeld. Vergrößerung 200 ×.

Figur 5. Wie Fig. 4, aber Frühholz. Die Eiporen sind zum Teil rund und quergestellt. Vergrößerung 200 ×.

Figur 6. Längsschnitt (Ätzzinn) durch die Zone an der Markkrone. Das zentripetale Holz „p“ ist auf beiden Seiten von längsgestreckten Markzellen eingeschlossen. Tracheiden mit Spiralverdickungen. Bei „s“ Sekundärholz.

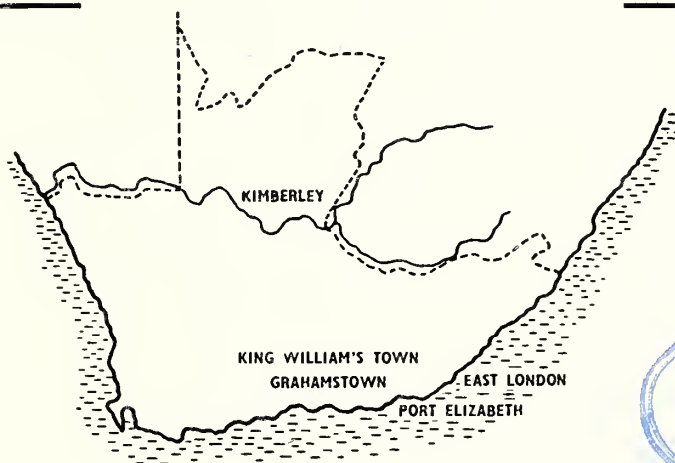
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SOUTH AFRICA

A New *Serranochromis* (Pisces, Cichlidae) from the Incomati River System, Eastern Transvaal, South Africa

by

R. A. Jubb (Albany Museum, Grahamstown)

Tributaries of parts of the Limpopo and Incomati River systems have their sources in the ridge of high ground forming the Steenkampsbergen of the eastern Transvaal. As this range of mountains reaches to over 7,000 feet in places, many of these mountain streams are suitable for trout and a large hatchery is operated by the Provincial Fisheries Institute at Lydenburg.

Intensive river surveys carried out by biologists of the Transvaal Provincial Fisheries Institute have resulted in the discovery of isolated populations of some interesting fish species. In a tributary of the upper reaches of the Crocodile River, Incomati River system, a population of *Kneria auriculata* (Pellegrin) was discovered, as yet the only *Kneria* ever to have been collected south of the Sabi-Lundi River system in Rhodesia. The species is polytypic and these specimens differ from *K. auriculata* from the Gorongosa plateau, Portuguese East Africa, and the eastern highlands of Rhodesia only in having a slightly higher average scale count. It must be mentioned here that the original description of this species (Pellegrin, 1905) is incorrect. After examining a large number of specimens of *Kneria* from the vicinity of the type locality of *auriculata*, a request was submitted to Dr. M. Poll, Tervuren, Belgium, to examine the type specimens in the Paris Museum. This he very kindly carried out and discovered that the lateral line scale count was in the order of 80–85 and not 60 as stated.

In the upper reaches of the Blyde River, as well as in the Treur River, a tributary, and in each case above waterfalls which are today barriers to the upward movement of fish, there are dwindling populations of *Barbus treurenensis* Groenewald, 1958, a unique endemic species which has not been discovered anywhere else in southern Africa. An isolated population of *Barbus neefi* Greenwood, 1962, was discovered in a small tributary of the Ohrigstad River, Limpopo River system. Specimens were sent to Greenwood who described this species from material received from the headwaters of the Upper Zambezi River. No *B. neefi* have been recognized from intervening points. Other examples of such a remarkable discontinuity in distribution are *Barbus argenteus* Günther, 1868, described from Angola and found also in the highveld tributaries of the Incomati and Pongolo River systems, and *Alestes lateralis* Boulenger, 1900, which occurs in the Upper Zambezi River system as well as parts of Zululand, Natal (Crass, 1964). On the other hand *Barbus unitaeniatus* Günther, 1866, originally described from Angola, occurs in all inland waters from the Upper Zambezi River to the Pongolo River.

Two species endemic to the Incomati River system are *Barbus amnectens* Gilchrist & Thompson, 1917, and *Barbus brevipinnis* Jubb, 1966. The most surprising discovery made during a recent survey by members of the Transvaal Provincial Fisheries Institute was that of an undescribed *Serranochromis* in the Sabie and Sand rivers, tributaries of the Incomati River.

In her revision of the genus *Serranochromis* Trewavas (1964) has mapped the distribution of various *Serranochromis* species on pages 51–53. These have been combined in Figure 2, their distribution boundary to the south being outlined with dashes. The distribution of this new species of *Serranochromis* has been marked with an open circle and that of *Chetia flaviventris* Trewavas, 1961, with a cross. It will be seen that we have here another example of discontinuity in distribution, no representative of the genus *Serranochromis* ever having been found in the southern tributaries of the Middle and Lower Zambezi River systems, or any



Figure 1. The distribution of some freshwater fishes in southern Africa

- *Alestes lateralis*
- ▲ *Kneria auriculata*
- *Barbus argenteus*
- ⊕ *Barbus neefi*
- *Engraulicypris brevianalis*



Figure 2. Outline of the region where representatives of the genus *Serranochromis* occur north of the Incomati River system.

○ The type locality of the new species *Serranochromis meridianus*

rivers south of this. There is, of course, *Chetia* Trewavas, 1961, a genus closely related to *Serranochromis* (Trewavas, 1964), whose distribution is restricted to parts of the Limpopo River system, and the Komati River, a large tributary of the Incomati River. It is interesting to note that this new *Serranochromis* and the Komati River *Chetia* species are not found together in the Incomati River system. In carrying out a detailed examination of specimens of *Chetia flaviventris* it has been found that a ventral vertebral apophysis is present on the third vertebra and the definition of *Chetia* should be amended accordingly. The status of the *Chetia* species from the Komati River is still under investigation as the material on hand shows certain differences from Limpopo River specimens.

***Serranochromis meridianus* sp. nov.**

Holotype: Male 300 + 70 mm. from the Sabie River in the region of its confluence with the Sand River, both being tributaries of the Incomati River which enters the sea near Lourenco Marques, Portuguese East Africa. Collected by Mr. I. G. Gaigher in April, 1967, together with 25 paratypes. Albany Museum No. P.F. 913, paratypes Nos. P.F. 914.

One paratype has been deposited in the British Museum (Natural History).

The specific name refers to its distribution in relation to that of other representatives of the genus (See Figure 2).

Description: A *Serranochromis* with a remarkable superficial resemblance to *Serranochromis angusticeps* Boulenger, 1907, but differing in colour pattern, and in having a lower vertebral count, a lower number of scales along the lateral line series, and a lower number of rays in both the dorsal and anal fins.

In percentage of Standard Length: Depth of body 32 (60 mm. Std. L.)—42 (300 mm. Std. L.); length of head 39 (60 mm. Std. L.)—34 (300 mm. Std. L.); length of pectoral fin 20–24; length of caudal peduncle 16–18.

In percentage of length of head: Length of snout 37–42; length of premaxillary pedicels 39–42; diameter of eye 13 (300 mm. Std. L.)—25 (60 mm. Std. L.); interorbital width 19–22; length of lower jaw 47–56.

Mouth large, protractile with premaxillary pedicels extending well between the orbits. Maxillary extending to below or slightly posterior of nostril. Cleft of mouth 50°–60° with the horizontal.

Teeth (Figure 4) unicuspid, small and close-set, in two series in the upper jaw with intermediate teeth between the series in front, 50–80 teeth in the outer series of the upper jaw; lower jaw with two or three series. Gill-rakers (Figure 5) 10–12, short, stiff with extremities of upper 4–6 forked. Pharyngeal teeth (Figure 6) unicuspid, all slender. Pharyngeal bone slender, its width less than its median length.

Cheek deep, scales small and irregular with about 7–9 horizontal series. Lateral line series 34–36. Dorsal fin XIV–XV 12–13, anal fin III 8–10. In *S. angusticeps* the number of branched rays is higher, being 14–17 in the dorsal fin and 11–13 in the anal fin.

The number of vertebrae, taken from three specimens, including an X-ray photograph (Figure 7) is 32–33 as compared with 33–35 in the case of *S. angusticeps*. A ventral vertebral apophysis is present on the third vertebra.

In living material young fish are olive on the dorsal surface with silvery ventral surface, there being 7–8 vertical dark bars and 2 or 3 dark lateral stripes. At this stage specimens are easily confused with a species of *Chetia* found in the Komati River, a tributary of the Incomati River. Adult male *S. meridianus* are olive-brown on the dorsal surface, becoming silvery pale olive on the ventral surface. The fins are lemon-yellow to pale olive with numerous small red or orange-red spots on the dorsal, caudal and anal fins, the anal fin having at least 30–40 spots narrowly bordered with black. The dorsal fin is edged with orange. All scales, except those along the ventral surface and extreme dorsal surface have a distinct reddish centre. There is no

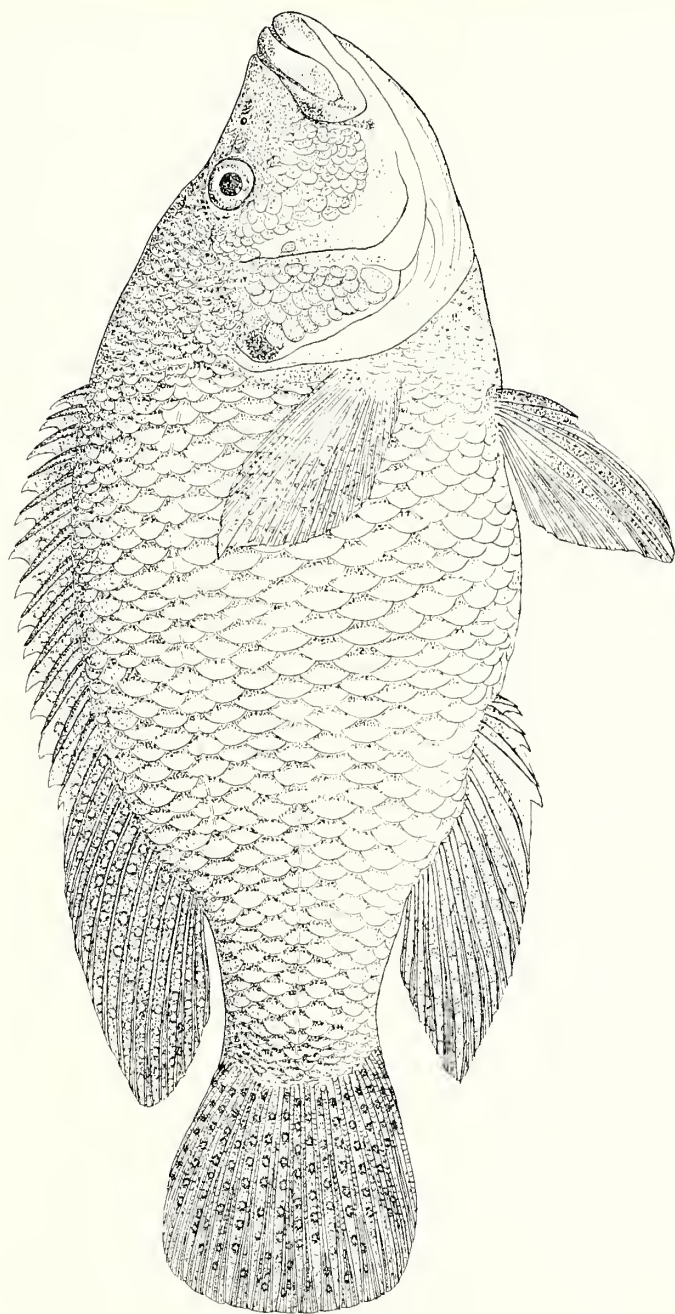


Figure 3. Type specimen *Serranochromis meridianus* sp. nov. Standard length 300 mm

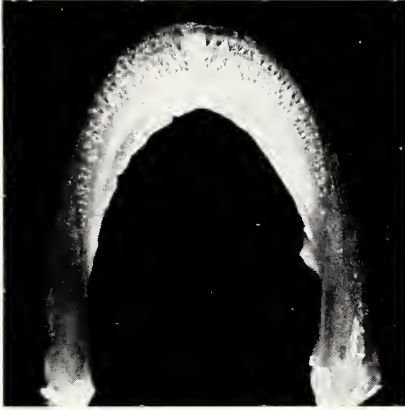


Figure 4. Upper jaw of a specimen of *S. meridianus* Standard length 195 mm.



Figure 5. Anterior gill-raker of a specimen of *S. meridianus* Standard length 195 mm.

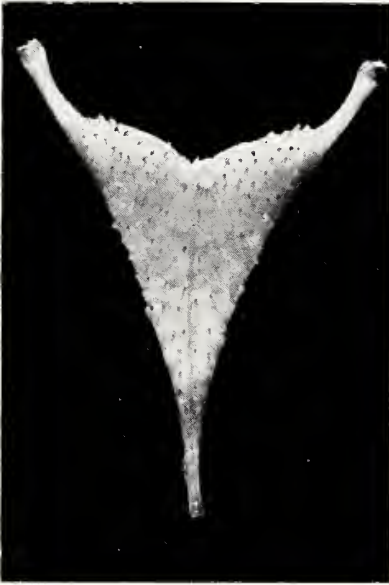


Figure 6. Pharyngeal teeth of a specimen of *S. meridianus* Standard length 195 mm.

oblique dark line through the eye as in *Chetia*. Young males have the red or orange-red spots developed to a lesser degree and are much darker due to the vertical bands and lateral stripes which fade in the adult. Adult females are pale olive to light lemon-yellow in colour with 30–40 small red or orange-red spots on the anal fin, the spots on the dorsal and anal fins being black. The dorsal fin is not edged with orange and the scales do not have reddish centres.

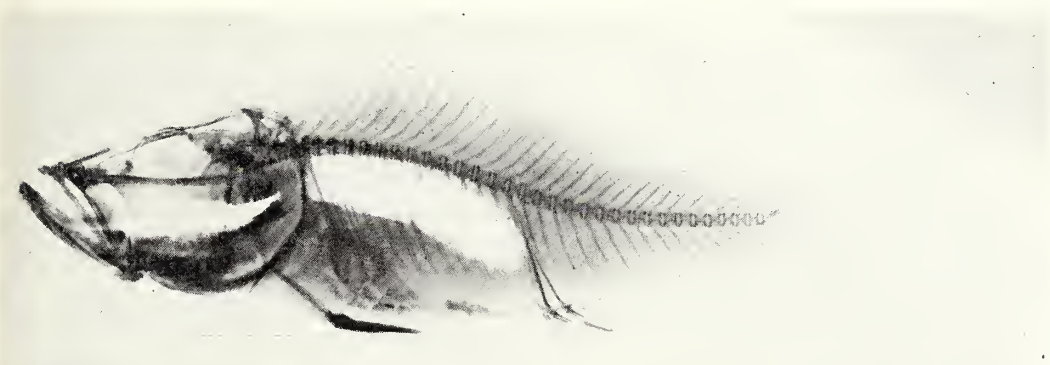


Figure 7. X-ray photograph of a specimen of *S. meridianus* Standard length 135 mm.

Ecology: In spite of intensive collecting in the region this *Serranochromis* is known only from the Sabie and Sand rivers in the vicinity of their confluence, approximately 1,000 feet above sea level. Pienaar (*in press*) has described the Sabie as a perennial river which, during the dry season, is placid-flowing with occasional rapids, the water at this stage being clear. The Sabie is subject to flooding during the summer months. Nothing is known of the breeding habits of *S. meridianus* but other representatives of this genus are mouth-brooders. From stomach contents these fish, even at a small size, predate mostly on other fishes.

Affinities: Referring to Trewavas' (1964) diagram (Fig. 1, p. 8) of the relationships of the species of *Serranochromis*, as well as the key for identification (p. 50), it will be seen that *S. meridianus* belongs to the group *S. angusticeps*, *S. spei*, *S. stappersi* and *S. janus*. Of these *S. spei* and *S. stappersi* occur in the eastern Congo River system, *S. janus* in a restricted portion of the Malagarazi River which flows into Lake Tanganyika, and *S. angusticeps* occurs in a much wider region which embraces the Cunene River, the Okavango, Upper Zambezi River system, the Kafue River and Lake Bangweulu. *S. meridianus* is the most southern representative of this group as well as of this genus.

ACKNOWLEDGEMENTS

The taxonomy of the freshwater fishes of southern Africa is part of a research programme carried out at the Albany Museum, and which is sponsored by the Council for Scientific and Industrial Research, Pretoria. I am indebted to the Senior Fisheries Officer, Mr. P. le Roux, of the Provincial Fisheries Institute, Lydenburg, and the Biologist, Dr. U. de V. Pienaar of the Kruger National Park, for material and data relating to this new species. The drawing of the type specimen was kindly prepared by Mrs. H. M. Jubb, and the X-ray photograph by Mr. F. L. Farquharson.

This paper is published by courtesy of the Director of the Albany Museum, Mr. C. F. Jacot Guillarmod.

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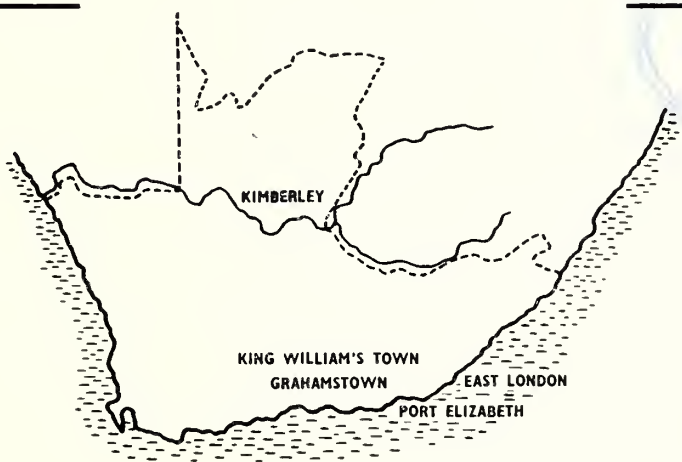
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A New *Chetia* (Pisces, Cichlidae) from the Incomati River System, Eastern Transvaal, South Africa

by

R. A. JUBB

Albany Museum, Grahamstown.

For many years the Transvaal 'canary kurper' of the Limpopo River was confused with *Serranochromis thumbergi* (Castelnau). In a paper read at the 2nd Symposium on African Hydrobiology and Inland Fisheries, Brazzaville, 1956, S. S. du Plessis drew attention to the doubtful status of *S. thumbergi*, a species of the Upper Zambezi River system, in Transvaal waters. Material was supplied to Dr. Trewavas of the British Museum (Natural History) who found that the specimens represented a new genus and species, *Chetia flaviventris* Trewavas, 1961. Recent surveys of the Komati and Lomati Rivers large tributaries of the Incomati River system, carried out by personnel of the Lydenburg Provincial Fisheries Institute, resulted in the collection of some Cichlids which, superficially, resembled either young *C. flaviventris* or *Haplochromis darlingi* (Boulenger). Additional material was obtained together with detailed field observations. On examination the specimens proved to represent a new species of *Chetia* which is described below.

Chetia brevis sp. nov.

Holotype: Male 128 + 27 mm. from the Lomati River, Barberton District, a tributary of the Incomati River which enters the sea near Lourenco Marques, Mocambique. Specimen P.F. 951, Albany Museum, Grahamstown, collected by Mr. I. G. Gaigher, September, 1967, together with ten paratypes, P.F. 952. Provincial Fisheries Institute registration No. M 67/186. One paratype has been deposited in the British Museum (Natural History), London.

The specific name refers to its smaller maximum size, shorter snout, shorter lower jaw and shorter premaxillary pedicels when compared with *C. flaviventris* the type-species.

Description: In percentage of Standard Length; Depth of body: 29 (88 mm. S.L.)—37 (135 mm. S.L.). Type 33.5 Length of head: 33 (88 mm. S.L.)—37 (135 mm. S.L.). Type 34.5 Length of pectoral fin: 18 (88 mm. S.L.)—26 (93 mm. S.L.) Type 23.0 Length of caudal peduncle: 20 (91 mm. S.L.)—16 (135 mm. S.L.) Type 20.0.

In percentage of length of head: Length of lower jaw 39 (88 mm. S.L.)—44 (135 mm. S.L.). Type 40.5. Length of snout 27 (88 mm. S.L.)—36 (135 mm. S.L.). Type 35.5.

Length of premaxillary pedicels: 21 (128 mm. S.L.)—26 (92.5 mm. S.L.). Type 21.0. Diameter of eye 20 (128 mm. S.L.)—26 (86 mm. S.L.). Type 20.0. Interorbital width 23 (92.5 S.L.)—26 (735 mm. S.L.). Type 24.6.

Mouth oblique, cleft 20°–30° with horizontal. Premaxillary pedicels reaching to between nostril and border of eye. Maxillary reaching posterior to nostril but not below border of eye. Teeth (Fig. 2) in upper jaw in two series with a few scattered teeth forming a third series anteriorly; teeth small, unicuspid, 40–50 in outer series. Gill rakers (Fig. 3) 9–10 on lower portion of anterior arch, the upper 4–5 short and stiff with extremities pointed.

Dorsal fin with 24–26 rays, comprising XIV–XV spines and 10–12 branched rays, type XIV 12. Anal fin with 10–12 rays, comprising III spines and 7–9 branched rays. Caudal truncate with rounded corners. Scales ctenoid, lateral line scale count 32–34, type 33.

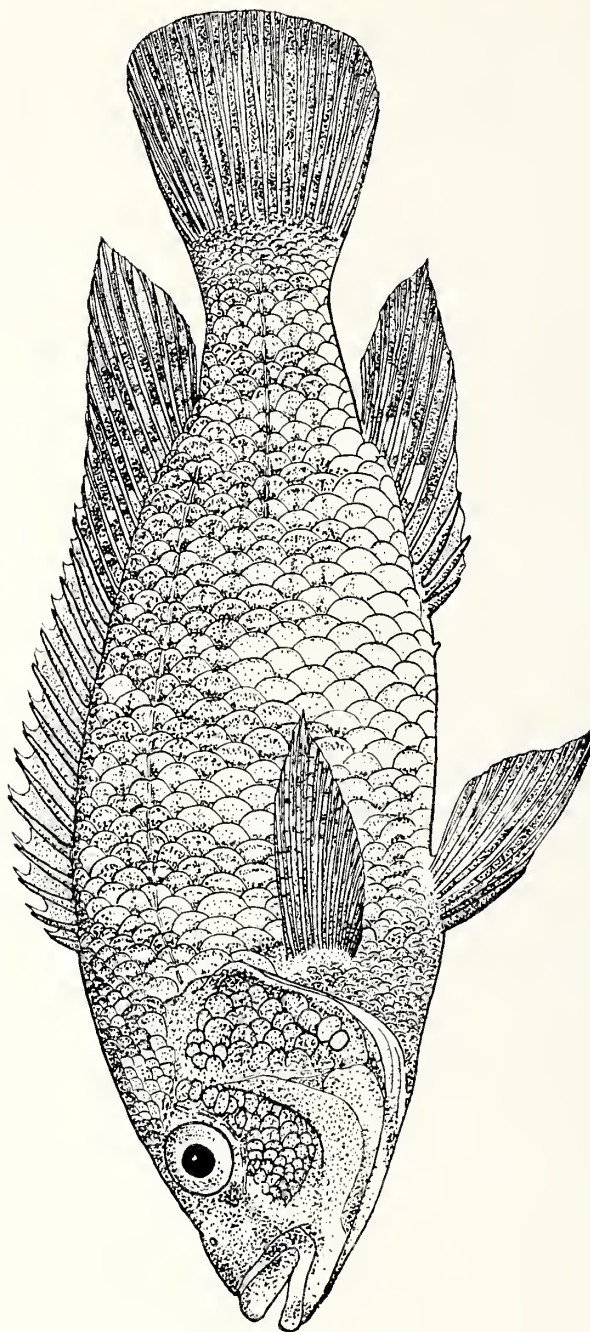


Figure 1. Type specimen of *Chetia brevis* sp. nov. Standard length 128 mm.

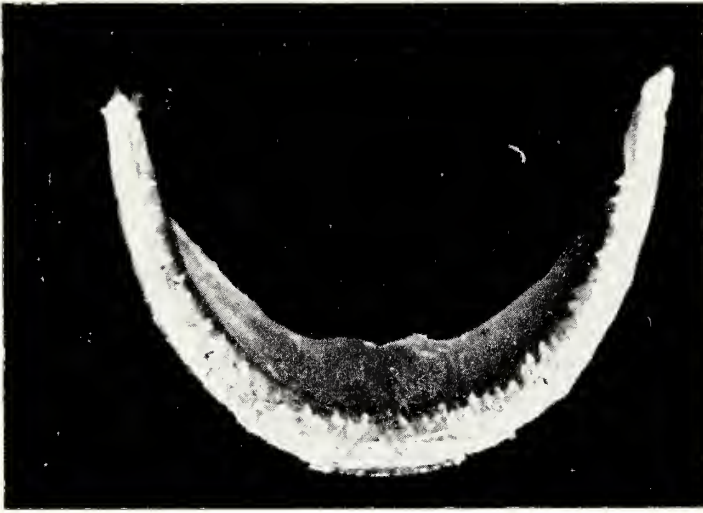


Figure 2. Upper jaw of a specimen of *C. brevis*. Standard length 95 mm.

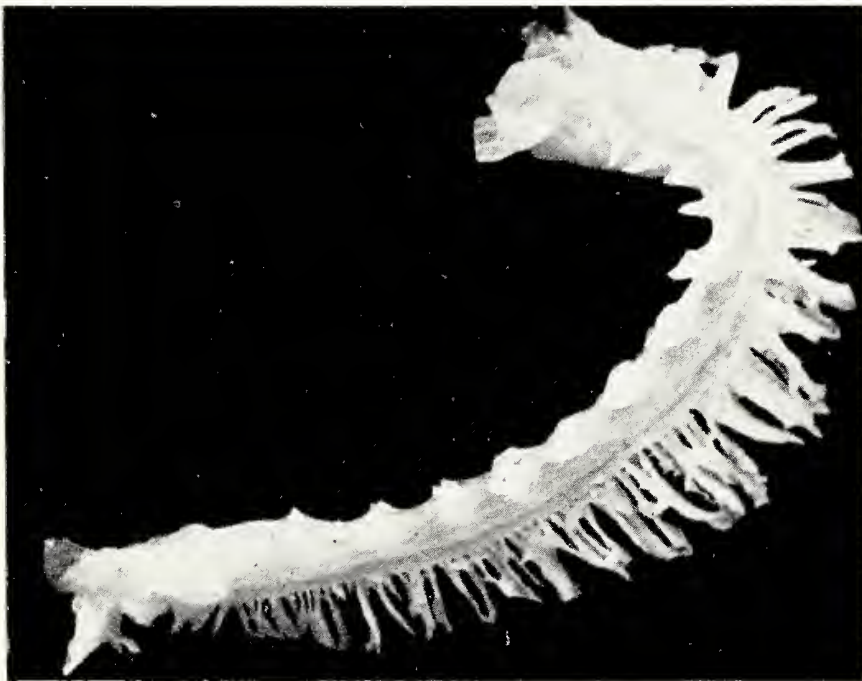


Figure 3. Anterior gill raker of a specimen of *C. brevis*. Standard length 95 mm

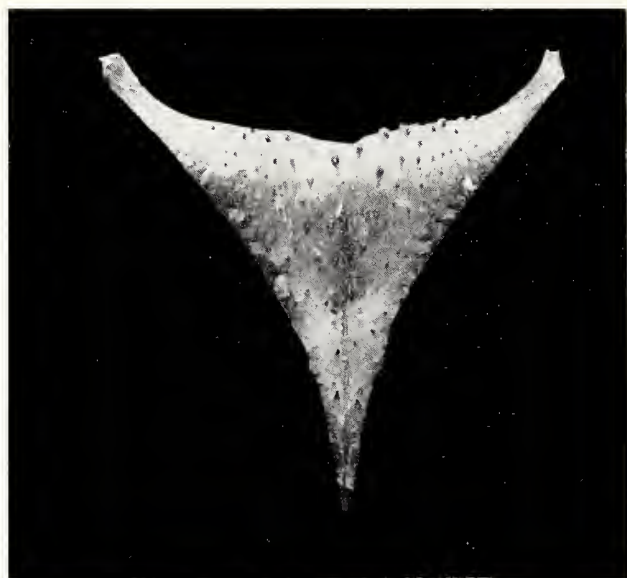


Figure 4A. Lower pharyngeal teeth of *C. brevis*. Standard length 95 mm.

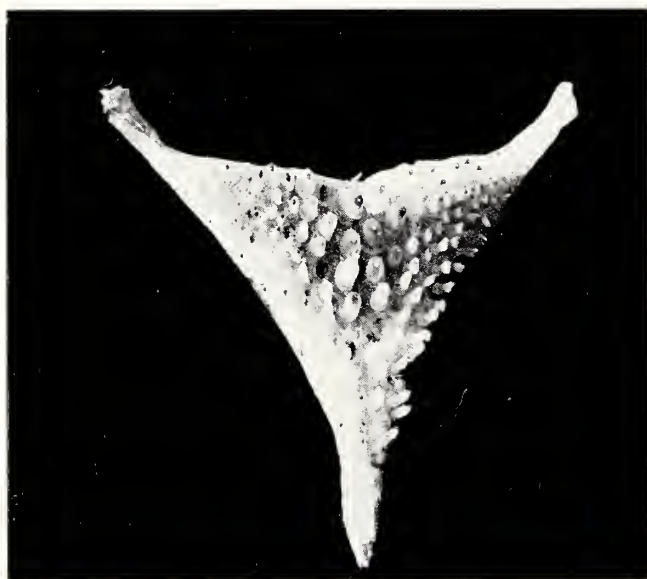


Figure 4B. Lower pharyngeal teeth of *C. brevis*. Slightly oblique view to show shape of teeth.

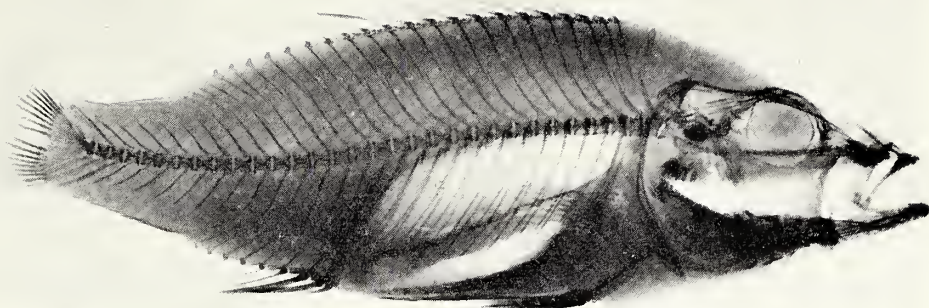


Figure 5A. X-ray photograph of type specimen of *C. brevis*. Standard length 128 mm.



Figure 5B. X-ray photograph of a specimen of *C. flaviventris* taken from Hartbeespoort Dam, Crocodile River, Limpopo River.

The lower pharyngeal bone is triangular, its dentigerous surface as broad as it is long (Fig. 4 A and B). The majority of the pharyngeal teeth are slender, pointed, with extremities hooked, but those teeth in the centre have stout bases.

Vertebral count for five specimens 30–31, the type (Fig. 5A) having 31. A double-keeled ventral vertebral apophysis is present on the third vertebra. Figure 5B is of a specimen of *C. flaviventris* from the Hartbeespoort Dam, Crocodile River, Limpopo River system.

Colour pattern: Specimens preserved in formalin have a shadowy mark between the eye and maxillary, a dark opercular spot, and a series of faint vertical bars which tend to link in some specimens forming an irregular lateral stripe. These body markings are more accentuated in the case of female or young specimens than in the case of an adult male. The membrane between the branched rays of the dorsal and caudal fins has numerous dark spots. The rayed portion of the anal fin of a male has one to four large ocellate spots. Living mature males are olive-brown on the dorsal surface, blending to pale silvery olive on the belly, the vertical bars and body markings being dark green-brown. The top of the dorsal fin is fringed with pale orange, the spots on the soft portion of the dorsal fin being the same colour. The large ocellate

spots on the anal fin are a bright orange. The female tends to be more silvery in colour and lacks the orange fringe to the dorsal fin, and the bright orange ocellate spots on the anal fin.

Ecology: As recorded by Gaigher (*in litt.*) the distribution of *C. brevis* in the Incomati River system is confined to the Lomati and Komati rivers below 1,500 feet above sea-level. This species has not been found, in the Incomati River, in association with *Serranochromis meridianus* Jubb, 1967, described from the Sabie River, an adjacent tributary of the same system. Material from Moçambique contains representatives of both species taken from Lake Chieunga, a freshwater lake situated near the coast between the mouth of the Limpopo River and that of the Incomati. This lake appears to drain into the estuarine portion of the Limpopo River. There are numerous freshwater lakes in this region and a taxonomic study of their fish faunas is being carried out in collaboration with Dr. Mário da Costa of Lourenço Marques. Until this has been completed it will not be possible to give a complete picture of the distribution of *C. brevis* and *S. meridianus* along the inland waters of the east coast.

Like *C. flaviventris*, *C. brevis* feeds chiefly on small fish and aquatic insects. It is a mouth-brooder, the female carrying the eggs.

Affinities: *C. brevis* differs from *C. flaviventris* chiefly in the colour pattern of mature males. Males of the latter species tend to be a bright yellow (hence the local name canary kurper) with numerous bright red dots on the anal fin. Mature males of *C. brevis* have one to four large bright orange ocellate spots on the anal fin. *C. brevis* has a greater interorbital width, a shorter lower jaw, and shorter premaxillary pedicels than *C. flaviventris*.

Superficially *C. brevis* could be confused with *Haplochromis darlingi* (Boulenger) and *H. callipterus* (Günther) (synonym *H. swynnertoni* (Boulenger)) but these two species have three distinct series of teeth in the upper jaw, and stout rounded teeth in the centre of the lower pharyngeal bone.

Note: Greenwood (1967) has drawn attention to the record of six specimens of *Haplochromis spekii* (Boulenger), a Lake Victoria Cichlid, from the Magalies River (Limpopo system) by Gilchrist and Thompson (1917). This has been investigated by le Roux who has informed me (*in litt.*) that these particular specimens cannot be found in the Transvaal Museum, but that there are two others, also identified as *Haplochromis spekii*, from the Hartbeespoort Dam, Crocodile River. These specimens should be identified as *Chetia flaviventris*.

Acknowledgements

The taxonomy of the freshwater fishes of southern Africa is part of a research programme carried out at the Albany Museum, and which is sponsored by the Council for Scientific and Industrial Research, Pretoria. I am indebted to the Senior Fisheries Officer, Mr. P. le Roux, and Mr. I. G. Gaigher, both of the Provincial Fisheries Institute, Lydenburg, for material and data relating to this new species. I am also indebted to Dr. Mário da Costa for supplying material from Portuguese East Africa. Mr. F. L. Farquharson of the Albany Museum kindly prepared the X-ray photographs and Mrs. H. M. Jubb the drawing of the type specimen.

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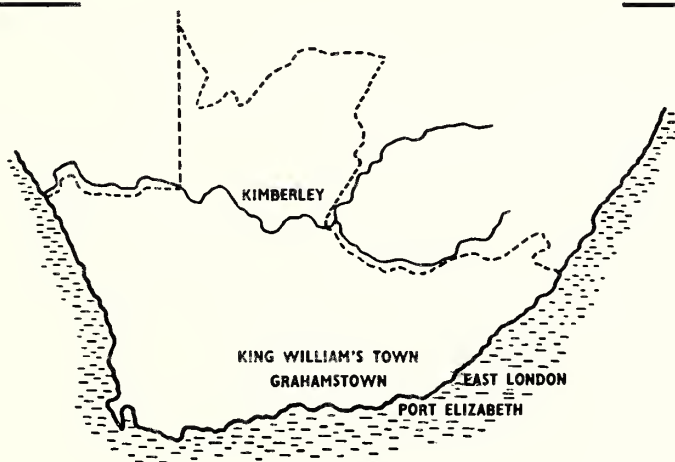
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Two new centipedes from southern Africa

by

R. F. LAWRENCE

(Albany Museum, Grahamstown.)

A new species of *Rhysida* is described from North Moçambique and a new subspecies of *Cormocephalus pseudopunctatus* from Kranskop, Natal.

A list of differential characters is given for the widespread and common centipede *Cormocephalus nitidus*, when comparing large adult forms with what are believed to be juvenile or half grown specimens of this species collected near Grahamstown.

Genus *Rhysida* Wood

Rhysida anodonta n.sp.

Holotype 1 ♀, *paratype* 1 ♀, Mituwe Mts., North Moçambique, collected D. G. Bradley, November 1964 (Natal Museum No. 9336).

Colour after preservation in alcohol: tergites slate grey but head and first two segments with parts of the third light yellow brown; toxicognaths, light yellow brown, legs very pale green; the fine, fur-like hair covering of the antennae giving them a pale golden colour.

Antennae with 16 segments, very long, reaching back almost to the posterior margin of tergite V, the two basal and $\frac{1}{4}$ — $\frac{1}{3}$ of the third segments, hairless.

Toxicognaths. The coxal plate distinctly wider than high, no spinose seta in the middle (as in *afra*), the distal margin with 4 distinct and separate teeth.

Tergites. Paramedian sutures beginning on tergite V or VI, distinct from VII backwards, posterior segments with very fine weak granulation, the granules well separated; about 5 very low indistinct keels, defined by a row of very small granules. Lateral emargination on the last 10 or 11 tergites.

Sternites entirely without sutures, a pair of very low indistinct depressions in each segment, rounded and large; last sternite about as wide as long, strongly narrowed posteriorly, the posterior margin straight, the postero-lateral angles rounded.

Legs. Coxopleurae of end legs with blunt rounded apical process, completely without spines, these also absent from lateral margin; lateral margin of porose area sinuous, curved strongly inward, the area reaching backward far beyond the posterior margin of last sternite; all segments of end-legs without spines, all legs with 2 distinct claw spurs, 2 tarsal spurs on legs I–XIX, 1 on XX, none on end-legs.

Dimensions: Total length 65 mm., end-legs 14.5 mm. The species differs markedly from all the species of *Rhysida* in southern Africa from which it can be distinguished by at least the complete absence of spines on the coxopleural process and in having the two basal segments of antennae and a very small basal portion of the third one hairless instead of the usual three smooth segments.

In Attems' key it appears to have as much or more in common with the South American species *R. citeris* (Humb. & Sauss.) than with the East African ones, *stuhlmanni* Kraepelin and *afra* (Peters) from these two species it differs in having a large number of posterior tergites

with lateral emargination instead of only the last one; in the sternites being without even short sutures; in the prefemur being quite unarmed; in the tergites, especially of the posterior half, being roughened with minute scattered granules, not shiny; in having only 16 antennal segments instead of 17 or 18 and in having the last sternite strongly narrowed posteriorly; it further differs from *afra* according to Attems figure (1929, p. 196, fig. 246) in having no spines on the toothplates of the toxicognath.

In most of these characters it also differs from *R. intermedia* Attems, described from "Nordpemba" (? = north of Pemba Bay, Moçambique).

Genus *Cormocephalus*

Cormocephalus pseudopunctatus bisulcatus subsp. n.

Holotype, 1 ♀, Kranskop, Natal, collected by B. Lamoral, August, 1967.

The subspecies agrees with the typical form in most respects; the head and first segment are larger, with fewer punctures, giving them a smooth shiny appearance.

Colour. Dull green throughout.

Antennae with the 3 basal segments hairless; toothplate of toxicognaths with few and weak punctures, 3 teeth on its distal margin, the inner on each side large and bifid.

Tergites. The main difference from *pseudopunctatus* lies in the two very distinct sulci on the headplate and first tergite occupying most of their length but not quite reaching the posterior margin; tergites II to VI without, VII with distinct sulci in its anterior half only; VIII backwards with complete deep sulci, the last tergite however without a median sulcus. Lateral emargination beginning on segment XII. Sternites as in *pseudopunctatus*.

Legs. End-legs with 6 ventro-lateral spines on prefemur arranged in two rows of 3, ventro-median surface with 4 or 5, 2 small dorso-median spines in addition to the edge-spine. All legs with claw-spurs.

Dimensions. Total length 41 mm.

Cormocephalus nitidus Porath.

C. nitidus Porath 1872, Öfvers. Vet. Ak. Förh., 28, p. 1154.

The genus *Cormocephalus* is in general composed of centipedes of small to moderate size; *C. nitidus* is however an exception for of approximately 29 species found in southern Africa, *nitidus* is by far the largest; this robust species may be as much as 104 mm. (4.2 inches) in total length, rivalling in size the two largest South African centipedes, *Scolopendra morsitans* and *Ethmostigmus trigonopodus*, 120 mm. and 130 mm. in length respectively.

The species is widespread throughout southern Africa with a vertical distribution from sea-level to an altitude of about 6,000 feet. Attems described a subspecific form *nitidus calvus* from Knysna differing from the type in the number of hairless basal segments of the antennae but it is very doubtful whether this form can be maintained as a separate taxon.

The colour of the largest examples is in general a terra-cotta or brick-red throughout, resembling that of *Alipes crotalus* in Natal and the Transvaal. It appears to be the only South African centipede to give off a foetid odour when irritated, this observation being due to Dr. Anne Alexander of Rhodes University.

At Grahamstown and other localities numerous smaller specimens up to 45 mm. in length have been captured under stones; they differ markedly from the large typical form in colour and appear at first sight to belong to a quite different species; in a number of small characters however they differ far less and all these differences are probably characteristic of the earlier growth stages, disappearing at later ecdyses as the centipede approaches maturity.

LAWRENCE: TWO NEW CENTIPEDES

The Albany Museum collections contain many large specimens of *nitidus* but in order to make certain of identification it was considered advisable to compare the type of *nitidus* with local material. Due to the good offices of Professor Per Brinck of Lund University and the Director of the Naturhistorisk Museet in Stockholm, the writer was enabled to examine Porath's type specimen of 1872 and to compare it with a specimen from East London of almost precisely the same size (84 mm.) in the collection of the Museum; the type is in a very good state of preservation, only the colouring having faded, and the two forms showed detailed agreement in all the characters described by Porath.

The differences between the large typical form and the blue-green half grown specimens found near Grahamstown (Howison's Poort) are shown in the following table:

Cormocephalus nitidus Porath
(84 mm. in length).

Blue-green specimens
(40-45 mm. in length).

Colour usually terra-cotta or bright brick-red throughout. Somewhat smaller specimens, presumably adult, are bronze green, the head, first two and last segments reddish brown; legs reddish, lighter than body.

Colour blue-green throughout; head a little darker, legs a little lighter.

Tooth-plates of toxicognath with 4 distinct, equally spaced teeth.

The outer tooth of tooth-plate distinctly removed from the others which are fused to form a plate with 3 small tooth-like projections; sometimes only 3 distinct teeth.

Stigma of segment III very large, half or only a little less than length of segment; twice as large as stigma of V.

Stigma of segment III at most a fourth to a third length of segment; not twice as large as stigma of V.

Last sternite with a large median depression.

Last sternite without a sulcus or depression.

Process of coxopleurae short, triangular; porose area far surpassing posterior margin of last sternite.

Process of coxopleurae long, cylindrical; porose area not surpassing posterior margin of last sternite by much.



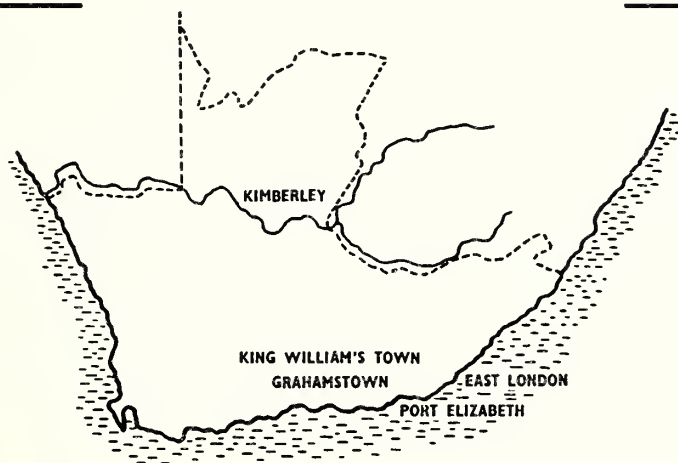
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On the status of some South African vipers

GARTH UNDERWOOD

(Sir John Cass College, Jewry Street, London, E.C.3.)

This brief investigation arose from an enquiry by Mr. John Visser concerning two type specimens of vipers of the genus *Bitis* in the British Museum (Natural History). Fitzsimons (1962) in his general survey of the snakes of Southern Africa gives the most recent account of the forms concerned. He recognises two subspecies of *Bitis cornuta* (Daudin), *cornuta cornuta* and *cornuta albanica* Hewitt. He treats *Bitis inornata* (A. Smith) as a full species and follows Boulenger in placing *atropoides* (A. Smith) as a synonym. He considers *Bitis caudalis* (A. Smith) as a monotypic species and for the first time separates *Bitis paucisquamata* Mertens from it as a full species. Mr. Visser indicated to me that he suspected that *albanica* of Hewitt is the same form as *atropoides* of Smith.

I examined the type specimens of *atropoides* and *inornata* and the British Museum specimens of *cornuta*, *caudalis* and *paucisquamata*. For comparisons I obtained on loan through the good offices of Mr. Visser four specimens identified as *cornuta albanica* from the Albany Museum and a problematic specimen from the Umtata Museum.

Ventral scale counts were made according to Dowling (1951a) and subcaudal scale on each side separately starting with the first pair meeting across the midline. Scale reductions were recorded according to the notation of Dowling (1951b). I made the same head scale counts as Fitzsimons. Vertical series of scales from the neck, midtrunk and base of the tail of several specimens were mounted on slides for examination of scale pits. Hemipenes of a number of male specimens were examined by a mesial incision along the shaft of the retracted organ extended onto the same faces of the lobes, in this way the sulcus was well displayed. The dimensions of the hemipenis are noted in terms of subcaudal scales as units. In addition in some specimens I examined features of the viscera that could be seen with only minor mutilation. The roof of the trachea was examined and the positions, in terms of ventral scale counts of the tip of the ventricle and the anterior end of the liver and the lengths of the two kidneys were recorded. A stroke separates left and right hand counts.

Bitis inornata (A. Smith) Holotype, B.M.N.H. 65.5.4.166

(Re-registered 1946.1.18.13) "Snow Mountains, near Graaf Reynet."

A. Smith 1849, plate 4 and text.

$$\begin{array}{r} \text{♀ V136, A1, C26/25 Scale rows (from V12)} \quad 25 \quad \begin{array}{r} +5(29) \\ +5(33) \end{array} \quad 27 \quad \begin{array}{r} +6(57) \\ +6(55) \end{array} \\ 29 \quad \begin{array}{r} -7(105) \\ -7(106) \end{array} \quad 27 \quad -14(111), 13+13 = 13(114) \quad 25 \quad \begin{array}{r} -6(118) \\ -5(116) \end{array} \quad 23 \text{ (to V128)} \end{array}$$

Scale round eye 13/15, between eyes 15, eyes separated from labials by 4/4, supranasals separated from rostral by 2/2, between supranasals 2, supralabials 15/13, infralabials 13/13, meeting anterior genials 3/3. No pits on trunk scales. Tip of ventricle at V41, tip of liver at V46, no tracheal lung, no vestigial left lung. Kidneys V114-128/V109-126. The colour pattern is well shown in Smith's figure.

Bitis atropoides (A. Smith) Holotype, B.M.N.H. 64.12.12.1

(Re-registered 1946.1.8.19) "40 miles east of Cape Town."

A. Smith 1849, plate 53 and text.

♀ V124 (first two divided), A1, C21/19 Scale rows (from V12)

25 +6(30) 27 5+6(93) 25 -13(98) 24 6+7(105) 22 12+12(108) 21 (to V122)
 +6(35) 5+6(87) 7+8(105)

Scales round eye 13/13, between eyes 12, separated from labials by 4/4, supranasals separated from rostral by 2/2, between supranasals 2, supralabials 13/13, infralabials 14/12, meeting anterior genials 3/3. Some pits on trunk scales. Tip of ventricle at V34, tip of liver at V40, no tracheal lung, no vestigial left lung. Kidneys V104-116/V96-114. The colour pattern is well shown in Smith's figure.

The four Albany Museum specimens identified as *cornuta albanica* and an additional British Museum specimen of "*inornata*" show the following major scale counts:—

No. 453	no locality, ♂	V125, A1, C26/26, Max. scale rows 27.
664	Brakkloof, ♀	V129, A1, C21/21, Max. scale rows 29.
6860	Kleinpoort, ♂	V121, A1, C24/25, Max. scale rows 27.
7135	Kleinpoort, ♂	V122, A1, C26/26, Max. scale rows 29.
46.6.13.44	"S. Africa" ♀	V121, A1, C22/23, Max. scale rows 29.

The colour pattern of these specimens is very much like that of the type of *atropoides* but on a lighter sandy yellow background, this could in part be due to differences of preservation. I was unable to find any other consistent difference between these specimens and the type of *atropoides* and conclude that *albanica* should be placed in the synonymy of *atropoides*.

Comparison of these six specimens with the type of *inornata* suggests that they come from populations sufficiently distinct to merit recognition as subspecies. These specimens and those recorded (as *albanica*) on Fitzsimons' map come from the Little Karroo, the type of *inornata* is alone in coming from the Great Karroo so they are clearly allopatric. The ventral scale count of *inornata* appears to be high for *atropoides* and the colour pattern places it entirely outside the range of variation of *atropoides*. The scale pits seem to be too variable and obscure to be of much use.

The Umtata Museum specimen proved to be highly relevant to a judgment of the relationship between *atropoides* and *inornata*. It has no precise locality but is presumably from the Transkei. This is at about the same latitude as *inornata* but well to the east so that it is approximately intermediate between the Great Karroo and Little Karroo.

No. 3552, ♀ V136½, A1, C25/25, Max. scale rows 29 (from V51-73).

Scales round eyes 16/14, between eyes 15, eyes separated from labials by 3/3, supranasals separated from rostral by 2/2, between supranasals 2, supralabials 13/13, infralabials 12/12, meeting anterior genials 3/2. No pits on trunk scales. Tip of ventricle at V39, tip of liver at V49, no tracheal lung, no vestigial left lung. Kidneys V114-129/V117-130.

The specimen combines remarkable agreement with the major scale-counts of *inornata* with the colour pattern of *atropoides*. The case for recognition of subspecies, already weak because we have only one specimen of *inornata*, is thus further compromised. On present evidence therefore I follow Boulenger in placing *atropoides* as a synonym of *inornata*. This arrangement carries certain implications that may be refuted by future field work. It implies that there is probably a gradient of increasing ventral scale counts passing from the Little Karroo to the Great Karroo. It assumes that the type of *inornata* is either a variant patternless individual in a mainly patterned population or that there is an east-west gradient of pattern reduction independent of the presumed ventral scale count gradient. Discovery of a *population*

of patternless individuals showing a more or less sharp transition to the nearest "*atropoides*" population would indicate the need for reconsideration of the question.

Comparisons were made with British Museum specimens of *cornuta*. Apart from the "horns" of *cornuta* I was unable to discover any clear difference between the two forms. On the other hand no specimens appeared to be intermediate in the development of the horns thus prompting the suspicion that they may be reproductively isolated. This suspicion is supported by a specimen of *cornuta* from Knysna, well within the range of *inornata*. Mr. Visser tells me that, judged by the nature of the country, Knysna is a highly improbable locality for *cornuta*. This specimen is part of a small collection of reptiles received from the Rev. G. B. Fisk. Mr. Visser feels that Knysna is an entirely plausible locality for the other species in the collection (*Agama atra*). It thus seems more likely that the specimen of *cornuta* was collected somewhere inland from Knysna as a base. As Fisk did collect elsewhere, notably the Port Nolloth area, there is presumably a possibility that labels were transposed. Hoping to obtain further evidence on the relationship of *cornuta* and *atropoides* I compared the hemipenes but could find no differences of note. Until we have clearer evidence that *cornuta* and *inornata* occur together I suggest that we retain *inornata* as a subspecies of *cornuta*.

Fitzsimons' key to the species of *Bitis* suggests that *caudalis* is not sharply distinguished from *cornuta* by external characters. Accordingly I compared specimens of *caudalis* and *paucisquamata* with *cornuta* and *inornata*. Using the key of Marx and Rabb (1965) I was not able confidently to separate *cornuta* and *inornata* from *caudalis* and *paucisquamata*. A few specimens of *paucisquamata* and *caudalis* show, albeit feebly, angulation of the ventrals as in *peringueyi*. *B. paucisquamata* is however readily separated by the low ventral count and single "horn". The variation of the lateral scales in respect of their orientation and size in relation to the dorsals was sufficient to obscure the distinction between *caudalis*, *cornuta* and *inornata* on this basis. There remained only a distinction resting on the number of "horns" with *caudalis* lying between *cornuta cornuta* and *cornuta inornata*. The material of *caudalis* includes a series of five specimens collected by Andrew Smith (B.M.N.H. 65.4.153a-e). Although not labelled as such these may well be his original types. No. 153c is a juvenile with reduced "horns" as mentioned in the original description of *ocellata* (a preoccupied name later replaced with *caudalis*), 153d is 14.0 inches long, the "adult size", (but the tail is only 1.0 inches, not a "ninth part") and 153e has exactly the ventral scale count of 149 (but 30 pairs of subcaudals instead of 27 pairs).

A brief survey of some internal features did however reveal some differences as well as further common characters. The trachea of one each of six other species was checked for comparison. Like the great majority of vipers, both viperine and crotaline (Brongersma 1949), *gabonica*, *arietans*, *nasicornis* and *worthingtoni* have the trachea expanded with a well developed lung. In *atropos*, *cornuta cornuta*, *cornuta inornata*, *caudalis* and *paucisquamata* the dorsal wall of the trachea is expanded but the vascularisation of the lung does not pass forwards of the heart. In *heraldica* there is neither expansion of the roof of the trachea nor tracheal lung. The four forms *cornuta*, *inornata*, *caudalis* and *paucisquamata* all lack a vestigial left lung; they further do not appear to show any significant differences in respect of the size or position of the kidneys.

The hemipenes do however afford some useful differentiating characters. The hemipenes of *cornuta* (2 specimens) and *inornata* (1 specimen) extend to about C8 (the 8th subcaudal) with the crotch between the two lobes at C5. The sulcus spermaticus forks at C4 and its branches continue to the tips of the lobes. There are longitudinal folds on the shaft of the organ. Proximal to the fork of the sulcus are large spines, about 1.5c (1.5 subcaudal scale lengths) long, they continue as a dense carpet, diminishing in size, towards the tips of the lobes; there is no terminal awn. The hemipenis of *caudalis* (3 specimens) extends to C8-12, with the crotch at C5. The sulcus forks at C4 and its branches extend to the tips of the lobes. Small spines about

0.5c long, start only at the base of each lobe and continue, diminishing in size, towards the tip of each lobe where there is a terminal awn about 1c long. The hemipenis of *paucisquamata* (1 specimen) extends to C10 with the crotch at C6. The sulcus forks at C4 and the branches continue to the tip of each lobe. On the shaft at about the level of the fork of the sulcus there are spines about 1c long, they continue, diminishing in size, towards the tip of each lobe where there is a terminal awn about 1c long. Thus the presence of a terminal awn and the absence of spines on the proximal shaft distinguishes *caudalis* and *paucisquamata* on the one hand from *cornuta* and *inornata* on the other. For comparison one specimen each of the other two forms without tracheal lung was examined. *B. atropos* has a hemipenis like that of *cornuta* with a dense carpet of spines from the shaft to the tips of the lobes and no terminal awn. *B. peringueyi* has a bilobed hemipenis with neither spines nor terminal awns.

Less clear differences between the forms were evident in respect of the positions of the heart and liver. The positions of the tip of the ventricle and the anterior tip of the liver are expressed as percentages of the ventral scale count in the accompanying table.

Specimens		Heart	mean	Liver	mean	Heart-liver
<i>cornuta</i>	5	26-31%	29%	32-37%	34%	3-8v
<i>inornata</i>	3	27-30%	29%	32-36%	34%	5-10v
<i>caudalis</i>	7	30-34%	33%	35-43%	38%	1-12v
<i>paucisquamata</i>	5	26-30%	28%	30-36%	33%	4-9v

It can be seen that *cornuta* embraces *inornata* and nearly embraces *paucisquamata* whereas *caudalis* has its heart and liver distinctly further back and shows only a small overlap with its nearest relative *paucisquamata*. In respect of the interval between the heart and the liver there was great individual variation and no significant difference between the forms.

SUMMARY

Bitis cornuta albanica Hewitt is a synonym of *Bitis atropoides* (A. Smith). On present evidence *atropoides* is a synonym of *Bitis inornata* (A. Smith) and *inornata* is a subspecies of *Bitis cornuta* (Daudin). These two forms are readily separated from *Bitis caudalis* (A. Smith) and *B. paucisquamata* Mertens by characters of the hemipenis. These four forms, *B. atropos* (L.) and *B. heraldica* (Bocage) lack a tracheal lung, in this they are clearly distinguished from *B. arietans* (Merrem), *B. gabonica* (Dum. & Bib.), *B. nasicornis* (Shaw) and *B. worthingtoni* Parker in which the tracheal lung is well developed.

Lists of the specimens studied and the data collected are in the British Museum (Natural History) Reptile Section and the Albany Museum.

ACKNOWLEDGMENTS

It is entirely due to the enthusiastic interest of Mr. J. Visser that this brief study has reached the point that there are any conclusions to report, for these however I am responsible.

This study was undertaken during tenure of a Principal Research Fellowship at the British Museum (Natural History).

I am indebted to Dr. Donald G. Broadley for drawing to my attention that the British Museum specimens of *Bitis* "*peringueyi*" are in fact *B. heraldica* (Bocage), I have therefore not seen material of *peringueyi*.

UNDERWOOD: SOUTH AFRICAN VIPERS

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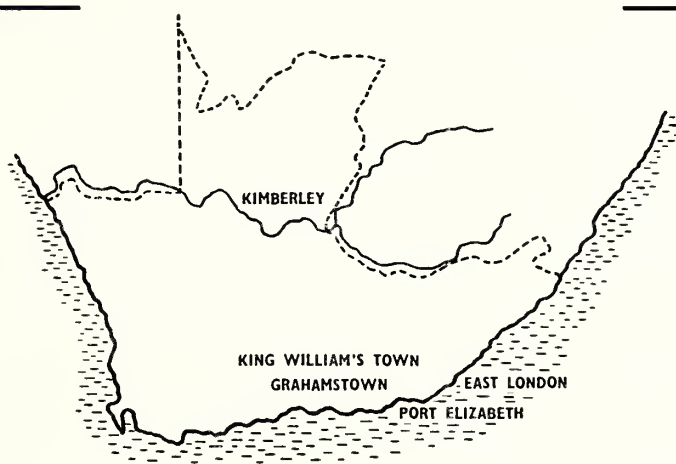
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Later Acheulean or Fauresmith?

A Contribution

A. J. B. HUMPHREYS (Alexander McGregor Memorial Museum, Kimberley)

INTRODUCTION

In 1963 while he was investigating an Iron Age site on the farm Muirton, Herbert, Mr. C. G. Sampson discovered a Fauresmith floor under red sand on a 40 ft. terrace above the Vaal River. Sampson carried out a small excavation and obtained a sample of the material. In March 1968 the present writer extended work at Muirton and uncovered a further 25 square metres of the floor. These excavations have yielded a good sample of cultural material. The site is significant as it has produced a sealed sample of an industry in a "Fauresmith 1" geological context.

THE SITE

The location of the site (28 33S 24 8 E) is indicated on the maps (Fig. 1). The site is 742.5 metres due west of the river and is located on a plain which was found to be the peneplained surface of calcified sands overlain by a thin layer of red sand. A profile taken down to the river revealed the site to be 12.7 metres (41.7 ft.) above the river. There is a gentle slope from the site towards the river where the level drops about 2 metres over 580 metres. From here on there is a relatively sharp drop to the water level in the river's present bed.

The artefacts were encountered underlying the red sand, but on the surface of the calcified sands. Diamond diggings about 3 metres above the river have exposed sections of the Younger Gravels which have yielded a few water-worn handaxes. The geological situation is thus that described by van Riet Lowe (1937 p90) for the Fauresmith 1—"The earliest occurrence of the Fauresmith culture is on the eroded or peneplained surface of the calcareous tufas that overlie the Younger Gravels . . . All the implements (about to be described) were found in sites under the red (Kalahari) sand and on the surface of the calcareous tufas . . ."

THE EXCAVATION

In order to obtain a larger sample of the material a grid 5 × 5 metres was laid out immediately adjacent to the cutting made by Sampson (176 sq. ft.). The excavation consisted of stripping off the overlying red sand so as to expose the spread of artefacts and stones lying upon the surface of the calcified sands. The depth of the red sand in the excavation was approximately 10 cm. This is not, however, the natural depth of the red sand in the immediate area as the top few centimetres were scraped off in 1963. The depth of the red sand is approximately 25 cm. in the area in general.

Sections through the excavation reveal very little as there was no appreciable slope of the surface of the calcified sands as revealed in the excavation and the red sand is of uniform thickness in that area.

The exact positions of all artefacts were plotted in the richest 9 square metres of the excavation, but this did not reveal any living patterns as the assemblage is not in a primary archaeological context. It is, however, a sealed sample and therefore considered to be relatively free of distortion.

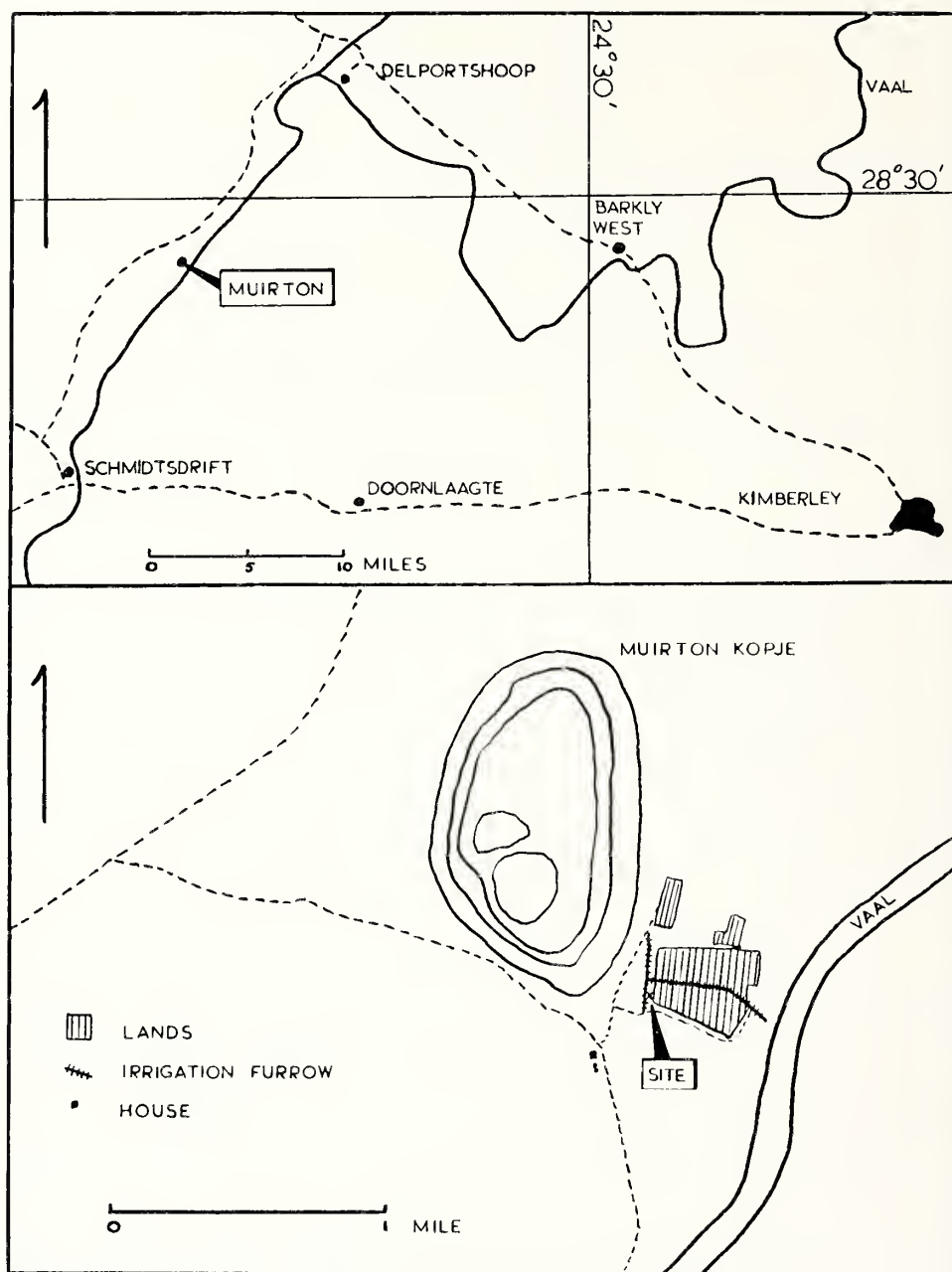


Fig. 1. Location Maps.

TOOL TYPES

The 1963 and 1968 excavations yielded a total of 868 artefacts.

The analysis of the material was based upon the method devised by Kleindienst (1962) for the Acheulean, with some modifications.

The material was divided into the following categories:

Shaped Tools: This includes most of the shaped types described by Kleindienst.

Utilised: This consists of pieces that have been utilised but not specifically shaped for that particular purpose: Utilised flakes, hammerstones and anvils.

Technological Waste: This category has been devised to accommodate material that is waste, but which has been produced as a part of the general stone technology. It includes unused flakes and cores which could also possibly be rated as "potential tools" in that they could have been utilised had the need arisen.

Trimmed Waste: This consists of odd chunks and pebbles which have two or more flakes removed but which exhibit neither classifiable shape nor edge.

Below is a breakdown of the material into the various categories and classes. The proportions are reproduced graphically in the histograms in Fig. 2.

Shaped

Handaxes	9		
Cleavers	2		
Knives	1		
Choppers	5		
Picks	—		
Large scrapers	2		
Small scrapers	118		
Core scrapers	6		
Discoids	4		
Spheroids	1		
Bifacial fragments	6		
	—	154	17.7%

Utilised

Flakes: whole	156		
broken	116		
Hammerstones	1		
Anvils	—		
		273	31.5%

Technological Waste

Flakes: whole	128		
broken	97		
Cores	86		

		311	35.8%
<i>Trimmed Waste</i>	130	130	15.0%

TOTAL 868

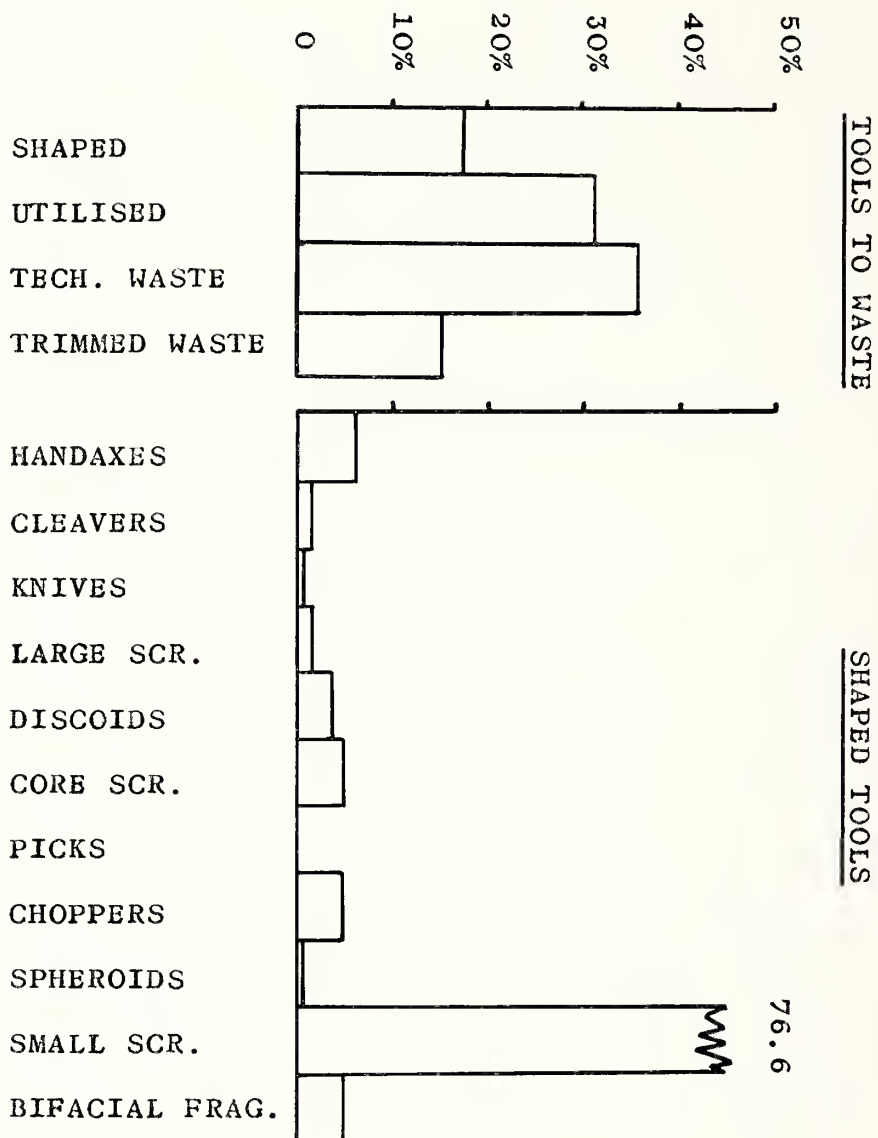


Fig. 2. Histograms.

DESCRIPTION OF MATERIAL

*I. Shaped**Handaxes:*

The excavations produced 9 handaxes. Of these 4 were slightly worn and the rest fresh. All but one lack completely the step flaking generally associated with the Fauresmith (Clark 1959 A p146). The step flaking on the exception may well be due to the thinness of the piece (23 mm) which may have made flaking difficult. The handaxes exhibit a large variety of shapes and sizes and these are reproduced graphically in Fig. 3. The handaxes illustrated in Fig. 4 No. 2 has a rather exceptional butt. At first glance it would appear that the specimen is damaged but it seems that the butt was deliberately shaped in this way by the removal of the flake distorting it as it is.

Below are the dimensions of the handaxes. In all cases length is the maximum possible dimension.

Length	Breadth	Thickness	
163	96	44	core
110	70	48	core
109	82	40	core
103	66	37	core
92	59	43	core
91	66	23	flake
90	74	25	flake
85	72	34	core
74	47	25	core

Length — mean 102 mm.
Standard Deviation 24.21

Breadth — mean 70 mm.
Standard Deviation 13.0

Cleavers:

Only 2 cleavers were recovered. One is heavily worn and details of flaking are obscure. It was probably made on a flake. The other specimen is fresh and made on a "side struck" flake. The cleaver edge shows flattening or blunting which may be the result of utilisation. (Fig. 5 No. 2).

Below are the cleaver dimensions:

Length	Breadth	Thickness	
158	93	52	flake
120	74	34	flake?

Knives:

The single knife recovered has a bifacial working edge opposite a blunt flattish edge.

Choppers:

Choppers made on river pebbles occur and are not a surprising feature of the heavy tools in view of the close proximity of the river. These pieces show bifacial flaking from the edge inwards to form a sharp chopping edge. (Fig. 6 No. 1). One "pebble chopper" is of particular interest as it shows flaking extended over one face and the side opposite to the chopping edge shows deep step flaking probably the result of trying to strike flakes from an unsatisfactory angle. This may represent the early stages in the shaping of a handaxe. (Fig. 5 No. 1).

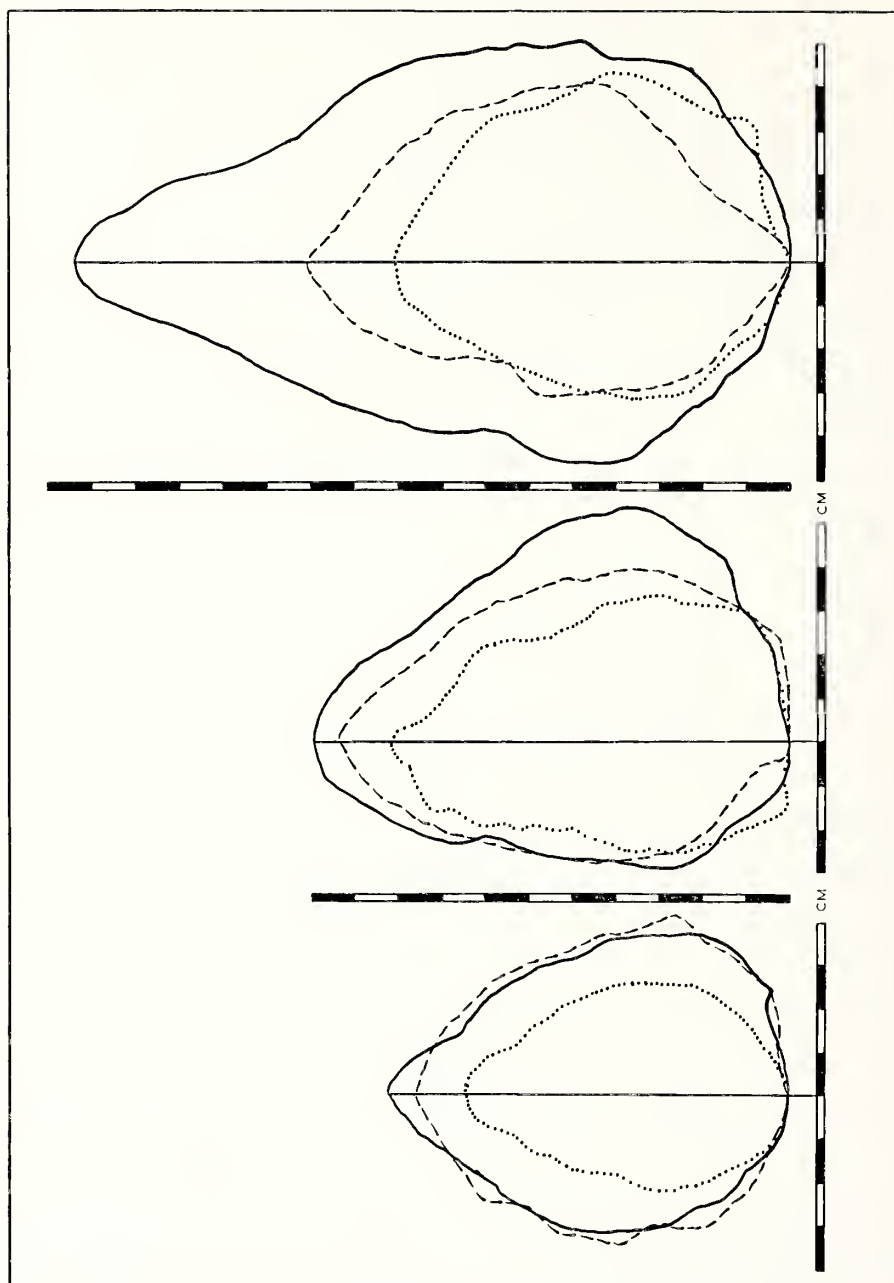


Fig. 3. Handaxe shapes.

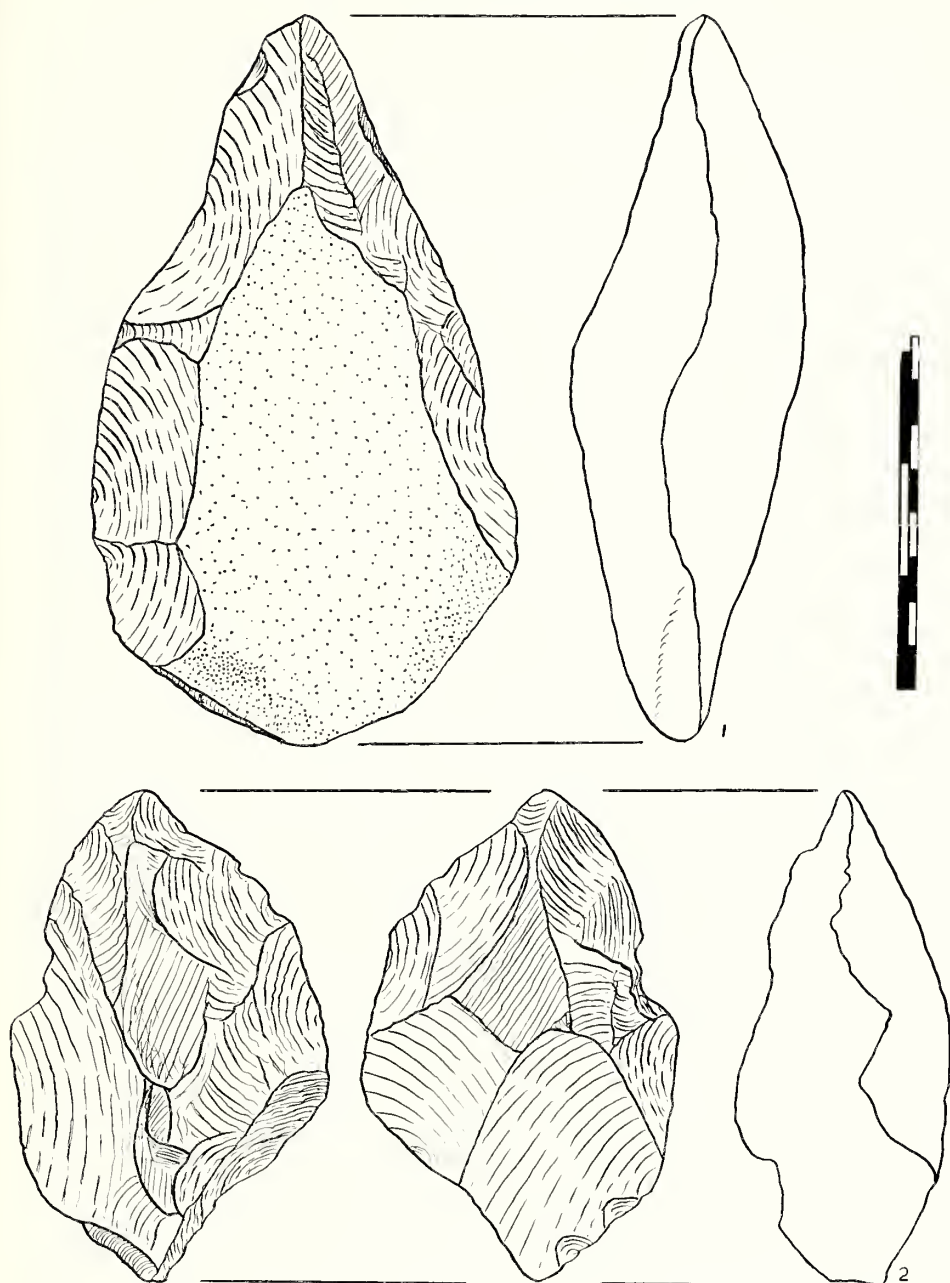


Fig. 4. 1. Large handaxe.
2. Handaxe with distorted butt.

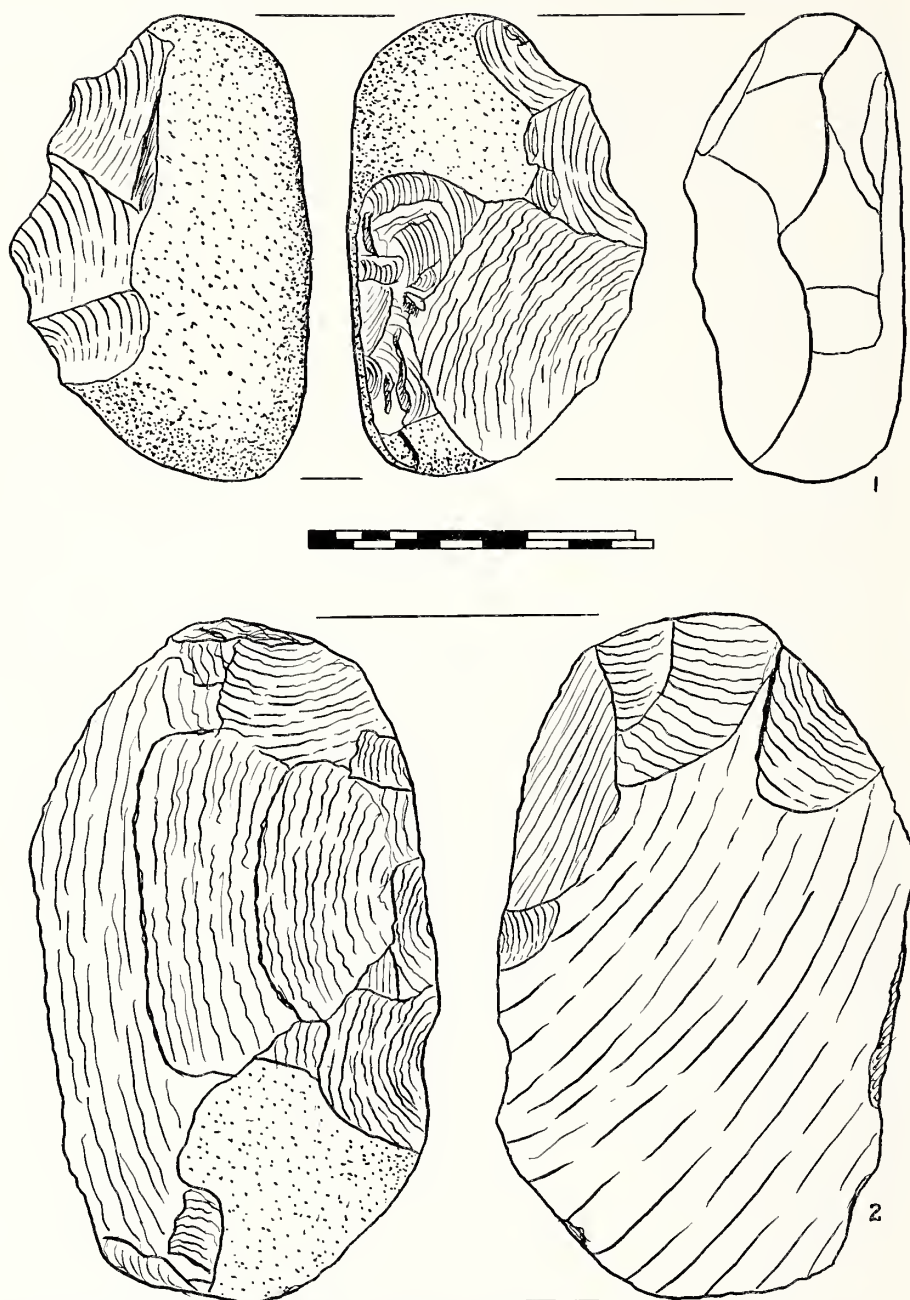


Fig. 5. 1. Pebble chopper showing working extended over one face.
2. Cleaver.

Picks:

No picks were recovered.

Scrapers:

The scraper group has been divided into "large" and "small" in line with the method employed by Kleindienst. "Large scrapers" are those that exceed 10 cm. in length. However, for the detailed analysis of scrapers this distinction has been ignored. It should be noted that all flake dimensions are taken with length being the maximum possible dimension regardless of the position of the striking platform. This procedure was followed because Sampson (1967) notes that he failed to get similar results between two workers if measurements were taken relative to platform position as this left room for interpretational and orientational differences. The present writer also encountered this problem of trying to determine the correct orientation of a flake. This was especially so in view of the irregularity of most of the flakes.

The Muirton scrapers are a very mixed lot. They were made on flakes of irregular shape and size which have convenient edges retouched. In view of the fact that it would be inaccurate to talk of "side" and "end" scrapers in the more specific and regular sense, the analysis of scrapers has been based on the number of working edges and the position of the edge or edges relative to the length. Below is the breakdown of the scrapers. It will be noted that several show retouch from the ventral rather than the dorsal surface and some show it from both surfaces. This fact further suggests that convenient edges were retouched when needed rather than set and regular scraper types being produced.

	Dorsal surface	Ventral surface	Both	Total
One working edge				52
side	40	5	0	
end	4	3	0	
Two working edges				13
asymmetric	1	1	1	
double side	1	1	3	
side and end	0	0	5	
Three working edges				7
double side and end	4	0	3	
Round	2	1	1	4
"Thumbnail" (<3 cm)	3	1	2	6
Denticulated				5
Steep (>70°)	14	0	0	14
Notched (<1.5 cm)				8
Hollowed (>1.5 cm)				11
				<hr/> 120 <hr/>

Asymmetric scrapers have two working edges that converge at a point at an angle to the length and which can therefore not be rated as "double side" or "end" or any other "symmetrical" combination. Round scrapers have a working edge around half or more of the edge of a roundish flake. Thumbnail scrapers are those under 3 cm in length while steep scrapers have a working edge with an angle of 70° or more. Hollowed and notched scrapers are distinguished on the basis of the "diameter" of the indentation on the edge of the flake—below 1.5 cm it is a "notch" and above that length it is a hollow.

The graphs in Fig. 8 compare the lengths and length-breadth ratios of scrapers and utilised and waste flakes.

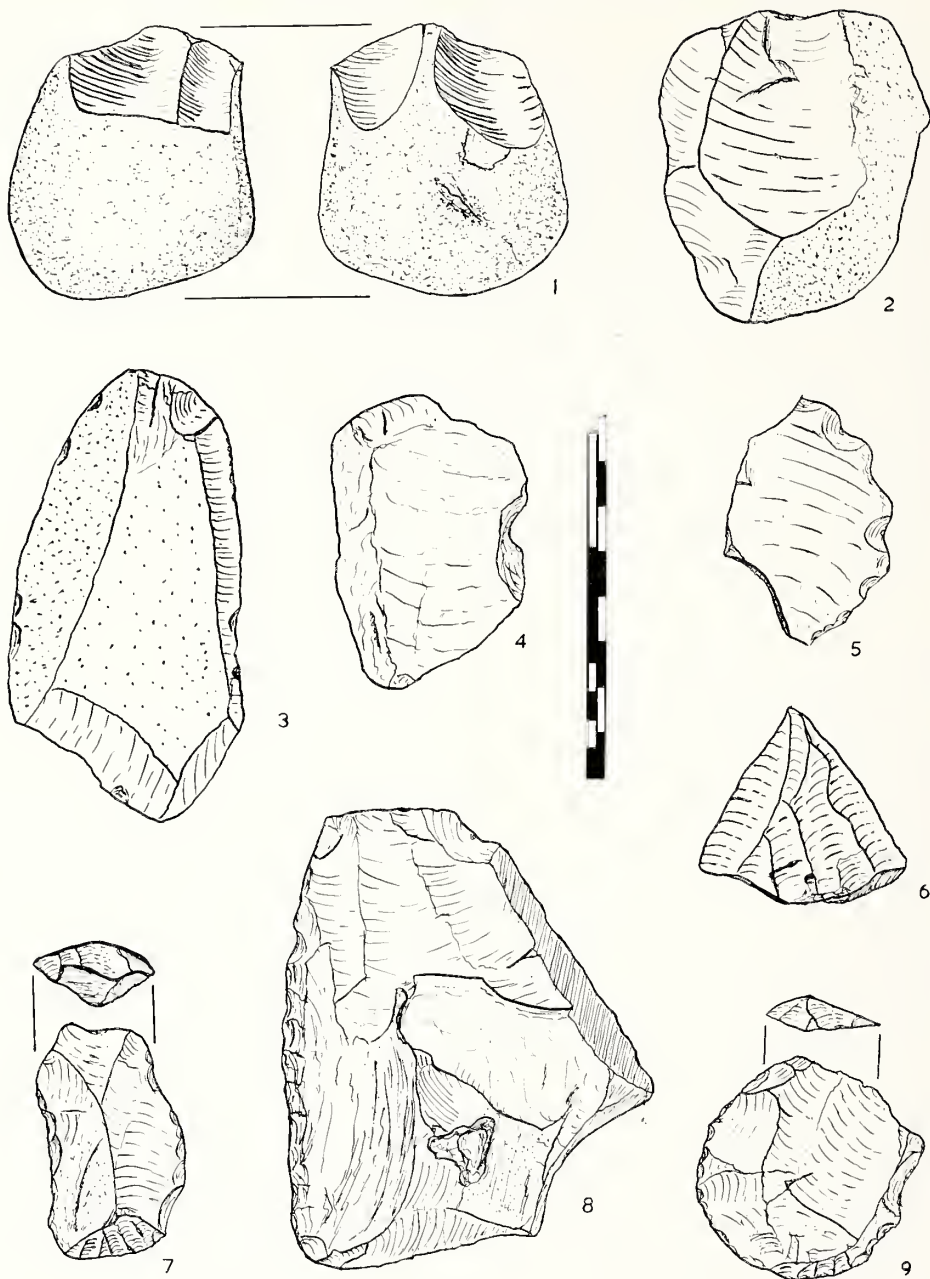


Fig. 6.

1. Pebble chopper.
2. Prepared core.
3. Utilised flake.

4. Notched scraper.
5. Denticulated scraper.
6. Pyramidal core.

7. Double side and end scraper.
8. Side scraper.
9. Round scraper.

HUMPHREYS: LATER ACHEULEAN OR FAURESMTIH?

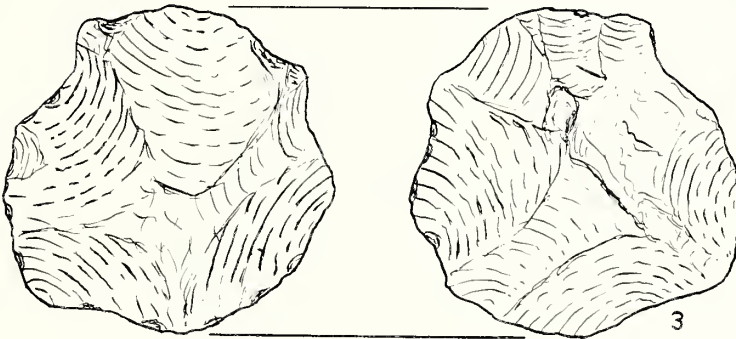
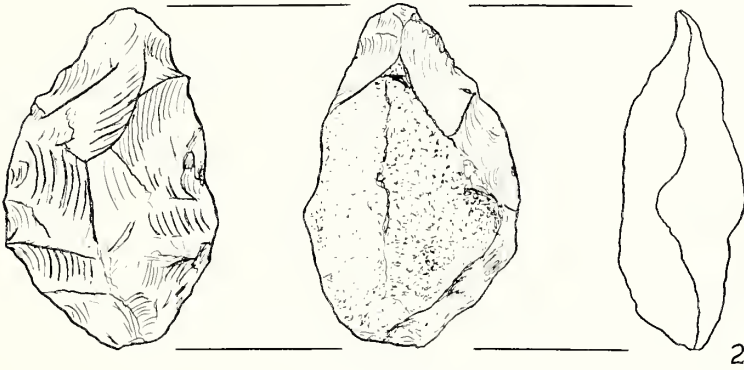
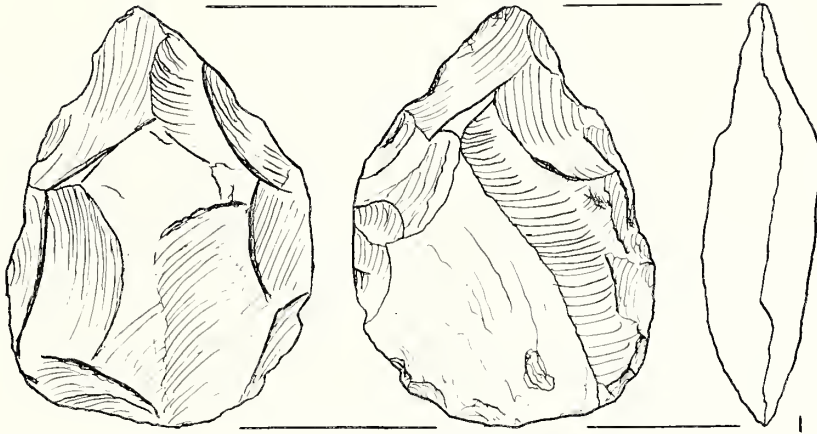


Fig. 7. 1. Thin step flaked handaxe.
2. Small handaxe.
3. Discoid.

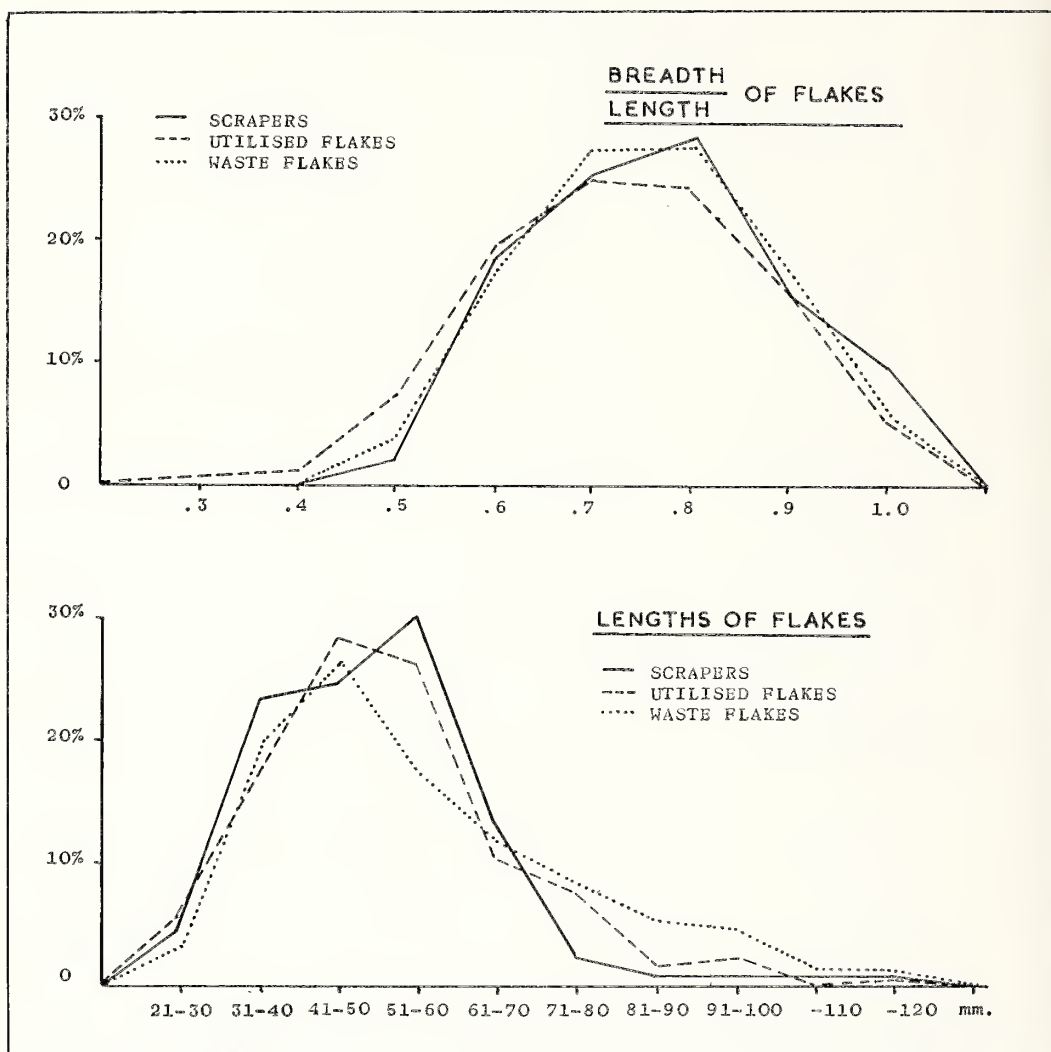


Fig. 8. Graphs showing length and length-breadth ratio of flakes.

Core Scrapers:

A total of 6 core scrapers was recovered. These consist of cores which show scraper re-touch on one edge adjacent to a more or less flat base.

Discoids:

These do not show any exceptional features.

Spheroids:

Only one spheroid was recovered.

Bifacial Fragments:

This class refers to fragments which have been shaped bifacially prior to damage or breakage. These include a handaxe or cleaver butt and other fragments which may represent handaxe points, as well as other bifacial types which are now indeterminate.

II. Utilised

Flakes:

The utilised flakes show nibbling along the edges but no signs of a definite edge having been worked onto them. They are thus rated as "Utilised" rather than "Shaped", although in practice, in some cases, they may well have served similar purposes to scrapers. It should be noted that in the graphs in Fig. 8 only the whole utilised flakes were measured as the broken ones would give false length and length-breadth ratios as Sampson (1967) has demonstrated.

Hammerstone:

One hammerstone was found. It consists of a pebble showing pitting on one end as a result of hammering.

Anvils:

Although several large stones were recovered along with the artefacts none of them showed any signs of having been used as an anvil.

III. Technological Waste

Flakes:

All unused flakes are rated as waste although they may well have been used had the need arisen. They are waste in this assemblage in that they cannot be seen to have been used and may thus have been discarded by the makers in this particular instance.

Cores:

The cores are a mixed lot with few conforming to any set types. Below is a simple breakdown of the cores:

Micro (<5 cm)	9
Prepared	6
Pebble	8
Large (>10 cm)	13
Miscellaneous	50
	—
	86

RAW MATERIAL

The raw material, in the main, consisted of quartzite. Other types of raw material played a very small part in the sample recovered.

Shaped — all quartzite except 1 shale.

Utilised — all quartzite except 1 jasper, 4 chert, 1 lydianite.

Technological Waste — all quartzite except 1 shale, 1 jasper, 1 quartz, 3 chert.

Trimmed Waste — all quartzite except 2 shale, 1 jasper, 1 quartz.

Of all the flakes about 59·0% have cortex or original "crust" of the raw material remaining on the dorsal surface. (As this includes broken flakes the figure cannot be taken as absolute). The retention of cortex on a flake means that it was struck from the outermost part of the block of raw material used. In view of the fact that more than half of the flakes were struck from this outer surface section it would seem that fully as much of the utilised raw material was outer surface as was inner material exposed by that flaking away of the outside. This indicates that the raw material was available in smallish chunks or pebbles rather than as large boulders or exposures of rock. In smaller pebbles there would be more surface area available relative to inner material than there would be in the case of large exposures of solid rock and this larger quantity would be reflected in the nature of the dorsal surface of the flakes struck from this material. It is suggested that the retention of cortex is the result of the form in which the utilised raw material was available and not necessarily a sign of crudeness in flake production. The Muirton raw material was therefore smallish pebbles or chunks probably obtained from river gravels and the form of this raw material determined to a large extent the shape and nature of the flakes struck from it.

CONCLUSIONS

The true status of the Fauresmith has long been a subject of debate among archaeologists. Van Riet Lowe (1929 p 71) said, "The Fauresmith is an industry closely allied to the Stellenbosch. It is difficult yet to say whether it is an evolved or specialised branch of the Stellenbosch due partly or entirely to the presence of a useful material as Lowe is inclined to believe . . ." Clark (1959A p 148) noted that "Outside the indurated shale areas the Fauresmith shows certain typological differences fundamentally due, it is believed, to the different nature of raw materials . . . in the Northern Transvaal where quartz and quartzite were the normal materials employed (and) the tools consequently tended to preserve the traditional Chelles — Acheul forms". In 1962 Mason (1962) proposed that the term Fauresmith be abandoned as the last part of the Acheulean. Recently Fock (1968) has argued that the term Fauresmith should be kept and not incorporated into the Acheulean. It would appear, however, that much of the argument has been based on consideration of assemblages that have been called "Fauresmith" either because of their nature or because of their chronological position but with neither fact being demonstrated to be completely reliable. In many cases they have not even been sealed samples and with rather dubious credentials. The Muirton site seems to make a significant contribution to this problem. The chronological position of the assemblage is the same as that described by van Riet Lowe as Fauresmith I (van Riet Lowe 1937). However, van Riet Lowe's assemblages from this situation were composed largely of indurated shale or lydianite while the Muirton collection is mainly quartzite. What is the significance of this difference? It would appear that the result of the use of quartzite as a raw material in this context and in its available form is that an Acheulean character is retained.

Of all the flakes only 33 have recognisably faceted platforms. The graphs (Fig. 8) indicate that there is no specialisation of flakes produced for use as scrapers and the scrapers themselves lack regularity both in shape and in the positions of edges produced. A similar phenomenon has been noted by Clark (1959) at Broken Hill where he says, "A critical examination of the various forms of scraping tool from the Acheulean horizon indicates that while the general shape of the tool may vary . . . the working edge or edges in almost every instance presents exactly the same characteristics . . . This indicates, it is considered, that the original shape of

the flake or nodule before its use as a tool was largely immaterial to the user provided that it could be conveniently held and was a shape and size suitable for the purpose for which it was required".

It would thus appear that, apart from the handaxes and cleavers (which are typically Acheulean tools) the industry lacks a specialisation of tool form. It could therefore be suggested that the Muirton assemblage is Later Acheulean — "Acheulean" because of the character of the assemblage and "later" because of its position in geological time. However, before making this assignation, it is worth noting that Seddon (1966) has suggested, on the basis of the geology, that all the major Early Stone Age assemblages of the South West Cape represent a late stage. This is stated in spite of the fact that some of the material has a "crude" appearance. He says (Seddon 1966) "The cruder tools are found in areas where raw material is abundant in the form of river or beach pebbles". This is combined with the idea that "an implement represents a compromise between an ideal form and greatest economy of effort".

These observations are also relevant in this context for the solution to the problem of "Later Acheulean" or "Fauresmith" seems to lie in the relationship between cultural needs and the form and quantity of the raw material available. Not only should assemblages of comparable age and from comparable environments be studied but full attention must also be paid to the form in which the utilised raw material was available at that time and place and also its accessibility and quantity in that particular form. Until such time as these factors have been related to suitable sealed samples the utmost caution should be exercised in the use of the terms Later Acheulean or Fauresmith. The indiscriminate classification of assemblages into either industrial group in the present state of knowledge would only tend to make the future solution of this problem more difficult and further cloud an already confused issue.

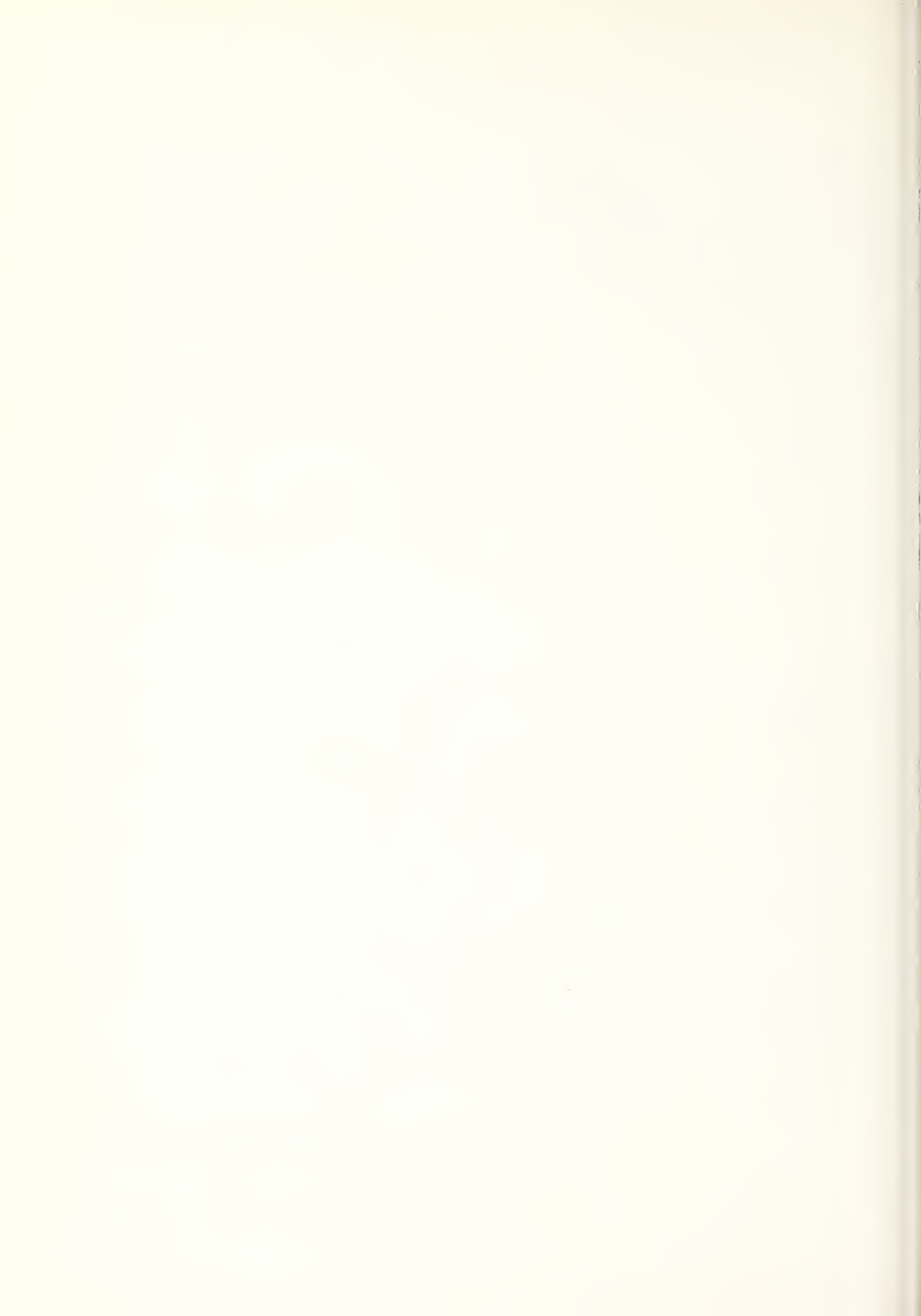
ACKNOWLEDGEMENTS

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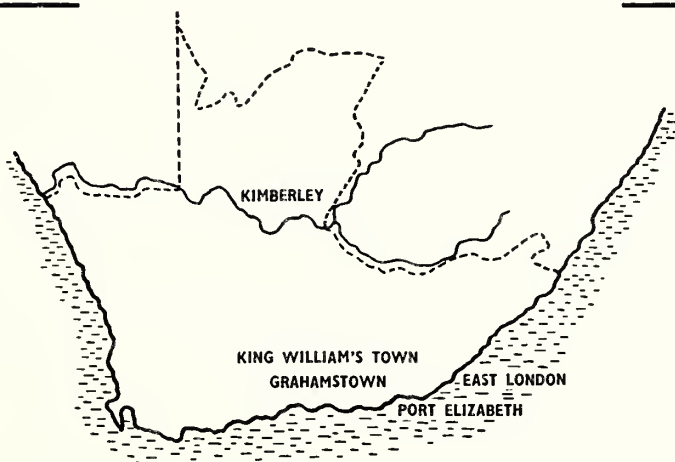
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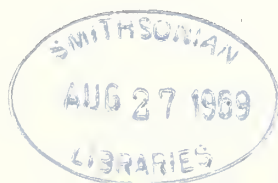
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Non-representational rock art in the northern Cape

G. J. FOCK

McGregor Memorial Museum

Abstract: Rock Art in the Northern Cape comprises paintings as well as engravings. This paper deals with non-representational designs only. Of 127 engraving sites, 23 show predominantly non-representational designs. 12 Painting sites show non-representational designs only: on a thirteenth non-representational as well as representational art occurs.

INTRODUCTION

The Northern Cape comprises an area of about 100,000 sq. miles. Up to the present (July 1968) nearly all the sites known have been visited for the purpose of publishing a complete catalogue of rock art in this area at a later date. This paper deals with the distribution of non-representational rock art north of the Orange River only. Of the known engraving sites 18% show predominantly (over 50%) non-representational designs, of the known 13 painting sites, 12 show non-representational designs. (Map).

Of the few sites not visited by the author, the McGregor Museum possesses copies by various scientists e.g. G. W. Stow, Maria Wilman and J. H. Power. Stow's copies are nearly all from the vicinity of Kimberley. A few of the original engravings have since disappeared, those from the Vaal River near Riverton are now submerged, but those from Driekops Eiland, called "Blauw Bank on the banks of the Gumaap or Great Riet River—Griqualand West" or "Bloem's Homestead" by Stow, are still there, as also those from Harrisdale/Willowbank, Pniel and Nooitgedacht—although they are labelled under other names. Some of Stow's and Wilman's copies are definitely unique and probably the only references to engravings and paintings which no longer exist.

On all sites under review engravings of animals and geometrical designs, or non-representational motifs, or Bushman Emblems (as they were called by Stow) occur with two exceptions: Harrisdale/Willowbank and Waterfall.

PART I

ENGRAVINGS

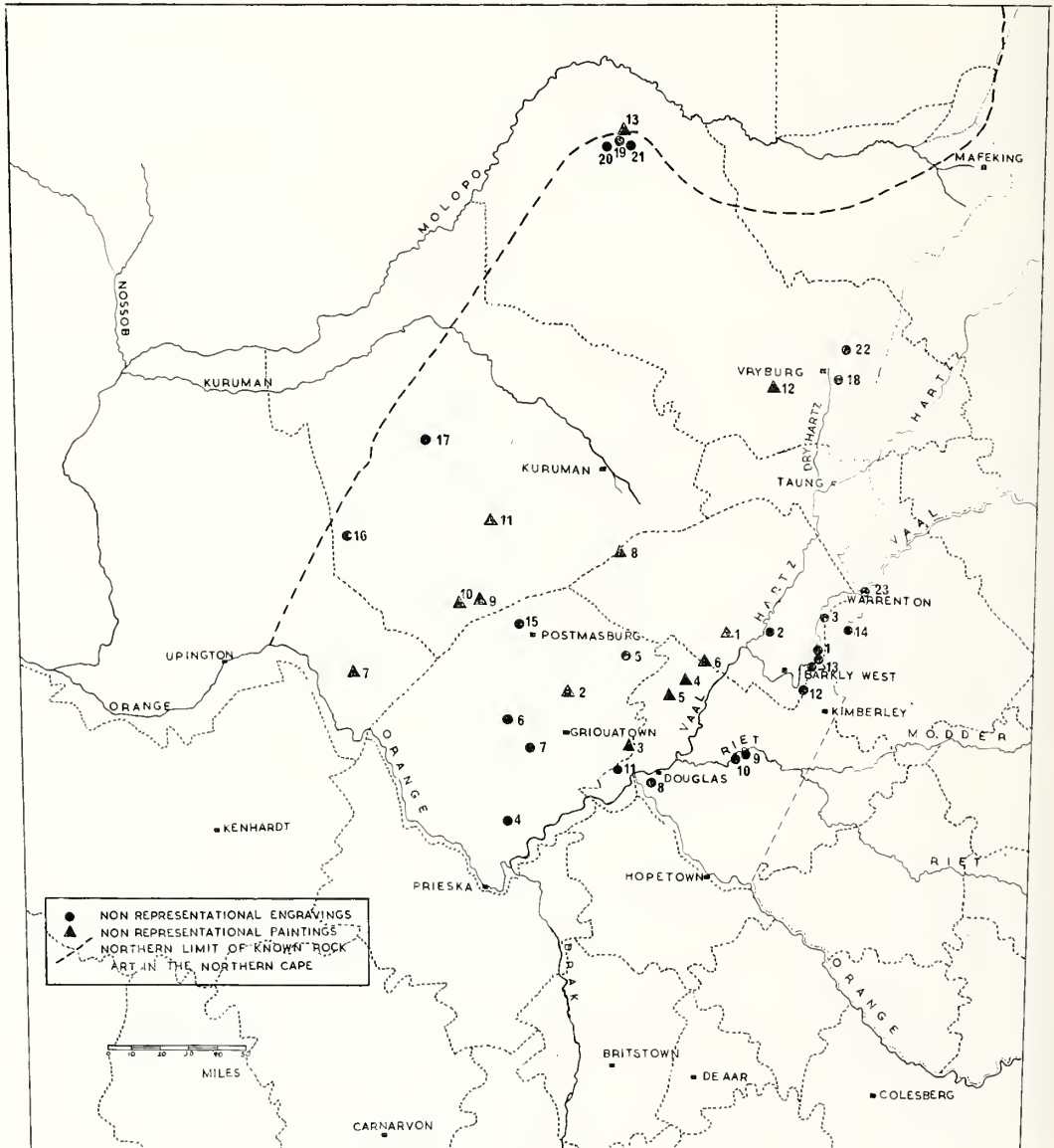
THE SITES

It must perhaps be stressed that all rock-engravings occur not too far distant from water and if on koppies usually not more than 60 feet above the valley. In the area under discussion the water table is not constant, therefore no accurate figure can be given as to the distance from "water" to "engraving site". Dr. F. W. Schumann, the geologist now stationed at Prieska who has an intimate knowledge of the water situation in the Northern Cape, writes in a letter dated 20.10.1967: "... You usually find that the surroundings of springs have been exploited and this made the water level drop, although elsewhere it might have remained constant, or even risen due to the building of dams. This year, after the heavy rains in April, pans and hollows held water for several months. In fact, several small and large pans still have water in spite of complete absence of rain since April, and the increasing heat of the months. ..."

As non-representational rock-engravings mostly occur at water holes, in pans, river-beds

or fountains they become partially or completely submerged after rains or when the river comes down in flood.

The sites are listed under farm names according to districts. Information as to the exact locality is available at the Northern Cape Regional Rock Art Recording Centre at the McGregor Museum, Kimberley.



Barkly West District

Harrisdale/Willowbank: The site comprises an area of 20 × 30 ft. on striated diabase in the Vaal River. Only non-representational engravings are to be found here: cross-in-circle, maze, grid, wavy line, oval with parallel horizontal lines, oval with grid and cross. They all belong to the Middle Period.

Newlands: On a small koppie near the bank of the Harts River, engravings occur on dolerite boulders: circle, chevron pattern, maze, converging lines, concentric circle connected to a maze, concentric circle connected to a ladder, spiral, "Seed of grapple thorn" and "Gifbol" (Wilman). They belong to the Middle Period. Next to the koppie stone circles can be found.

Waterfall near Windsorton: On dolerite outcrops about 10 × 10 ft. square close to the Vaal River asterisk, grid, multiple grid, double ladder, carapace, converging lines, dots between 2 lines, circle with dot occur. They belong to the Middle Period.

Hay District

Niekerkshope II: On a koppie of dolerite boulders between a dry river-bed and a rivulet mostly circles grouped into various patterns occur, as also circles connected with lines, oval with parallel horizontal lines, concentric circles connected with rays and loops with oblong grids at opposite sides reminiscent of patterns on Bushman knapsacks (Fig. 1), string pattern (Plate 1). The engravings belong mostly to the Middle Period, but some have been reworked or are imitations of the older ones.

ENGRAVING SITES

BARKLY WEST DISTRICT

- 1 Harrisdale/Willowbank
- 2 Newlands
- 3 Waterfall near Windsorton

HAY DISTRICT

- 4 Niekerkshope II
- 5 Rocklands
- 6 Sterkfontein
- 7 Vaalpan II

HERBERT DISTRICT

- 8 Bucklands
- 9 Driekops Eiland I
- 10 Driekops Eiland II
- 11 Katlani

KIMBERLEY DISTRICT

- 12 Nooitgedacht
- 13 Riverton (2 Sites)
- 14 Rooikraalfontein

POSTMASBURG DISTRICT

- 15 Beeshoek
- 16 Klapin
- 17 S'eenkamp

VRYBURG DISTRICT

- 18 Bernau
- 19 Katrina
- 20 Mahakane
- 21 Thlapin
- 22 Zoutfontein

WARRENTON DISTRICT

- 23 Nazareth

PAINTING SITES

BARKLY WEST DISTRICT

- 1 Rietfontein

HAY DISTRICT

- 2 Kogelbeen
- 3 Laer Kareefontein

HERBERT DISTRICT

- 4 Clear Water
- 5 Dickbosch
- 6 Voorspoed

GORDONIA DISTRICT

- 7 Dinah's Rust

KURUMAN DISTRICT

- 8 Wonderwerk Cave

POSTMASBURG DISTRICT

- 9 Andriesfontein
- 10 Meidekop

- 11 Toto

VRYBURG DISTRICT

- 12 Dithakwaneng Reserve
- 13 Spitzkop

Rocklands: This site is on a dolomite pan. Some 30 years ago a fountain was still there, but ceased to run after a well was dug. Today there is a borehole nearby. The engravings are unspoiled by man, but the majority are "worn down by animals which have passed over them in order to slake their thirst at the nearby fountain." (Wilman). The engravings are very reminiscent of Driekops Eiland I and II. They belong to one period only and could be taken as the classical "Type Site" for all rock-engravings in pans and river-beds. An area of about 100×100 ft. is densely covered with engravings. (Plate 2) a few are on slabs (about 2×3 ft.) but the majority are on the floor of the pan itself: several of the engravings are covered by a more recent layer of slightly cristalline calcrete.

The designs comprise double meander ending in loop with radiating lines, carapace (Fig. 2), ladder, wavy line, short dashes forming oblong ovate open at one end, parallel lines, two or three parallel lines with several lines protruding at right angles on both sides, double gong, parallel lines connected with vertical strokes, oval with vertical lines, circle with rays, asterisk. They all belong to the Middle Period.

Sterkfontein: On flat diabase boulders near an old fountain in an area of 30×150 ft. the following designs were recorded: asterisk, circle with rays, concentric circle with rays, grid oval with longitudinal lines, carapace, ladder. All engravings are of the same age (Middle Period). The owner of the farm was not aware of the engravings, but took the author to the site to show him an old "Bushman Camp" near the fountain where a number of LSA implements were found.

Vaalpan II: The site is near a rivulet and a borehole in a plain covered with red sand where isolated flat dolerite boulders occur. Engravings are found in an area covering about 2,500

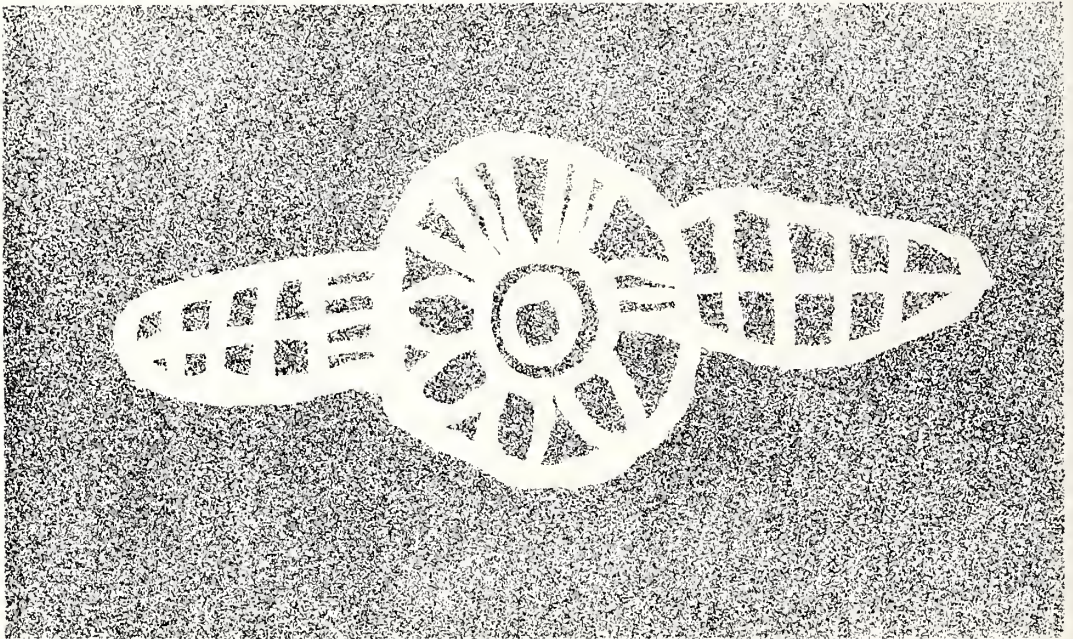


Fig. 1. Nickerkshoop II ($\frac{1}{2}$).

sq. ft., they comprise: asterisk, circle with rays, concentric circle with rays or loops (Plate 3), circle with three rays on one side only, concentric semicircles, cross-in-circle, grid with rays, ladder, maze, oval with longitudinal lines, 3 vertical parallel lines with 3 horizontal parallel lines left and right. They all belong to the Middle Period.

Herbert District

Bucklands: This site is near the Vaal River. The engravings are on isolated diabase boulders and were copied by Wilman in 1918. They comprise: parallel wavy lines, concentric circle with

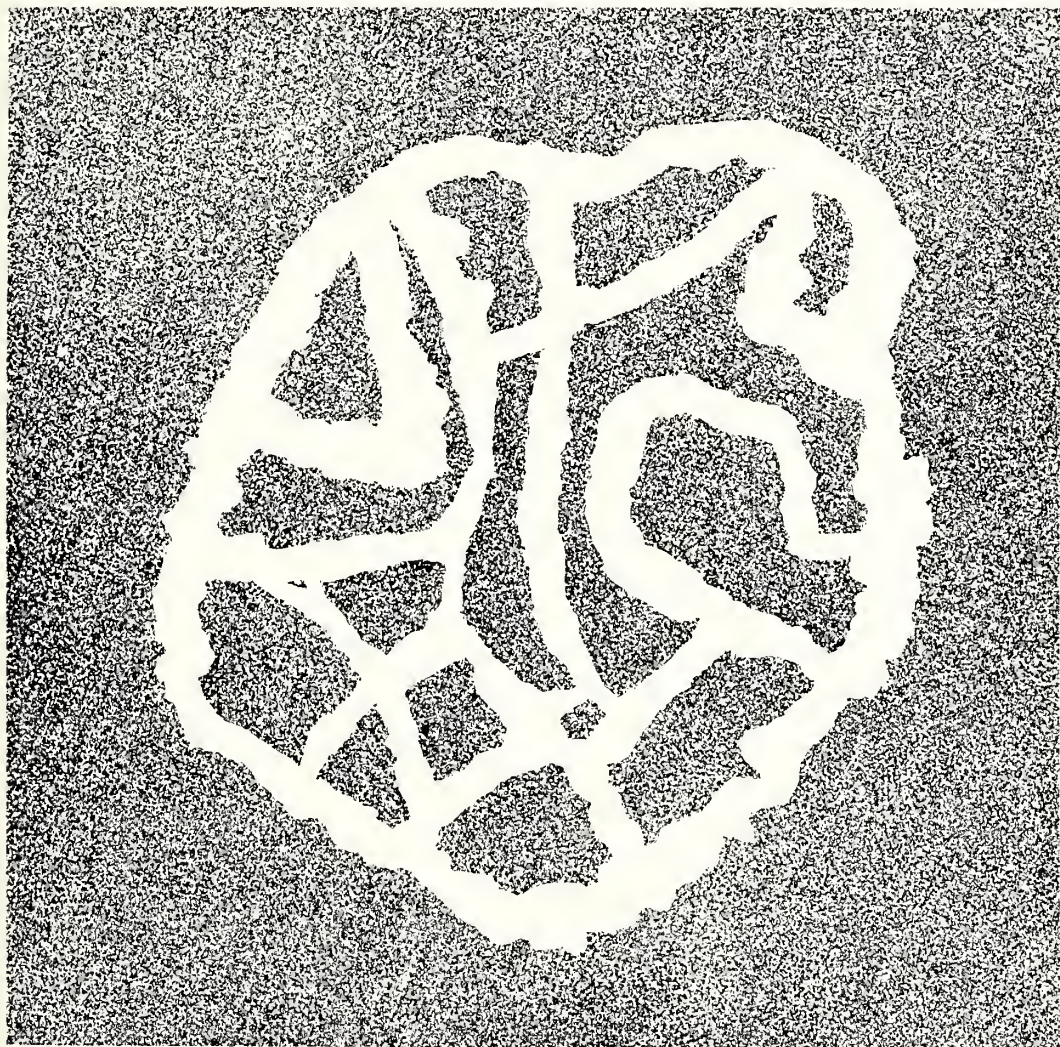


Fig. 2. Rocklands (1).

rays, circle with rays, asterisk, concentric circle with short rays (fringe) circle with loops, oval with longitudinal lines and short strokes on one end. They all belong to the Middle Period.

Driekops Eiland I: On this well-known site at least two engraving periods can be observed, the older one with animals and non-representational motifs. The younger one comprises mostly reworked non-representational engravings and some copies of old non-representational engravings. Some engravings on the western side look very much older and more worn than others, but this is believed to be the result of waterflow, as the river here is comparatively narrow so that after a few good rains this part becomes submerged. Other parts are covered by water only after heavy rains. M. E. du Toit (1964) found remnants of stone kraals in the vicinity which most probably were the living sites of the Springbok Korana, since Stow mentions "Bloem's Homestead" (Plate 4) when referring to Driekops Eiland. The younger engravings were probably executed by Korana, all the others belong to the Middle Period. They comprise circle, circle with rays, circle with diagonal lines and rays, cross-in-circle, cross-in-circle with rays, asterisk, asterisk-in-circle, grid, multiple maze, oval with longitudinal lines and rays, oval with grid and rays, oval with longitudinal lines, mushroom, ladder, chevron pattern, double meander ending in loop with radiating lines, wavy line, horizontal line topped with

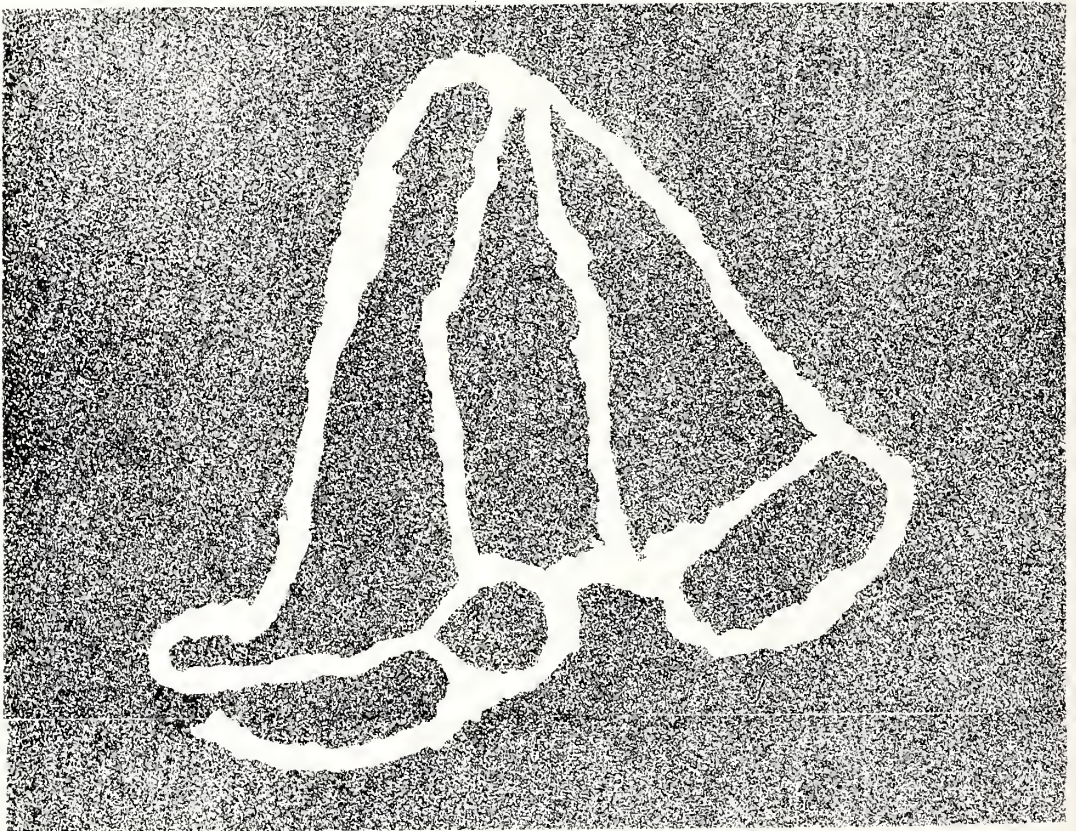


Fig. 3. Riverton. Copy M. Wilman (3).

short wavy line (see also Fig. 17; Dithakwaneng in paint), leaf shaped design, row of dots, oval with dots inside, mushroom with dots, parallel rows of dots, circles connected with long lines, double gong.

Driekops Eiland II: A site about 1 mile downstream from Driekops Eiland in and on the south bank of the Riet River is about 20 × 50 ft. in extent shows engravings of one period only, they are undisturbed by re-working. The patterns comprise: maze (Plate 5), asterisk, short converging lines, semicircle, mushroom, mushroom with dots, oval with longitudinal lines inside and short rays on one side only. They belong to the Middle Period.

Katlani: The engravings, well-known from Wilman's book, occur on striated diabase not far from the confluence of the Vaal and Orange Rivers. An area of about 3,000 sq. ft. is densely covered with engravings, many of which have been re-worked and there are instances of copies or imitations of the old engravings. The site is in a bad state of preservation owing to extensive physical weathering, and in addition, destruction by man is also evident. The non-representational engravings comprise: asterisk, asterisk connected with lines, concentric circles, concentric circles connected with lines, cross, maze, multiple maze, grid, multiple grid, wavy line, double edged saw, rows of dots, short parallel lines, ladder. The non-representational engravings belong to the Middle Period with the exception of the re-workings which are younger.

Kimberley District

Nooitgedacht: On striated pavements of diabase the following engravings are found: double ladder, rectangular grid, concentric circles with rays at 4 opposite sides, maze, double row of dots, oblong outline drawing filled in with dots, oval with grid, circles connected with double lines. The main engravings site is 10 × 20 ft. All engravings are of the same age and belong to the Middle Period, only a few have been re-worked in rather recent times.

Riverton: In the Vaal River near the present pumping station and now submerged were two sites. Engravings on boulders (probably diabase) were copied by Stow and Wilman: rows of dots, circle filled in with dots, converging lines with ovals at broad end with one opening. (Fig. 3).

Rooikraalfontein: On an outcrop of dolerite boulders near a vlei in a grassy plain the following engravings were recorded belonging to three different periods:

(a) eland surrounded by circle with rays, circles, horizontal line with downward triangle, asterisk, short chevron pattern;

(b) oval with rays on one side, concentric circles with pairs of parallel rays and loops round smooth surface used as grindstone, concentric circle with diagonal line in inner circle, outer circle with parallel pairs of rays, rectangle in double outline divided by parallel horizontal (Plate 6) and vertical lines and diamond, parallel lines forming patterns consisting mainly of triangles (Plate 7);

(c) lance-head, cross and initials.

(a) Middle Period, (b) Middle to Younger Period, (c) Recent.

Postmasburg District

Beeshoek: The engravings consist mainly of dotted lines on manganese covered with calcrete and they show up conspicuously in black (cf. Plate 4), covering an area of about 600 ft. along a rivulet. They comprise circle with dot, cup and saucer, concentric circles connected with lines, maze, grid, ovate with longitudinal lines crossed by horizontal lines, wavy lines, concentric circles, circle with parallel row of dots outside, parallel oval lines crossing at right angles. They belong to the Middle Period.

Klapin: The engravings occur on an outcrop of sandstone and cover an area of 2,250 sq. ft., they are near a waterhole, surrounded by red sand dunes. Nearly all of them comprise X-shaped designs. They belong to the Middle Period.

Steenkamp: The site is in a rivulet in the Korana Mountains where the engravings were made on sandstone. Due to water action they are rather shallow covering an area of about 900 sq. ft. They comprise asterisk, circle, concentric circles, circles connected with parallel lines, circles connected with a single line, circle divided by parallel lines. They belong to the Middle Period.

Vryburg District

Bernau: The site is near the Dry Harts. The engravings occur on striated pavements of diabase covering an area of about $\frac{1}{4}$ morgen. They comprise: cross, grid, cross-in-circle, asterisk, maze, asterisk attached to grid, small cups 30 mm. diameter, 15 mm. deep forming roughly a square over engravings of hartebeest and mystical creature (Plate 9), they all belong to the Middle Period. Bow and arrow and tectiform drawing are recent.

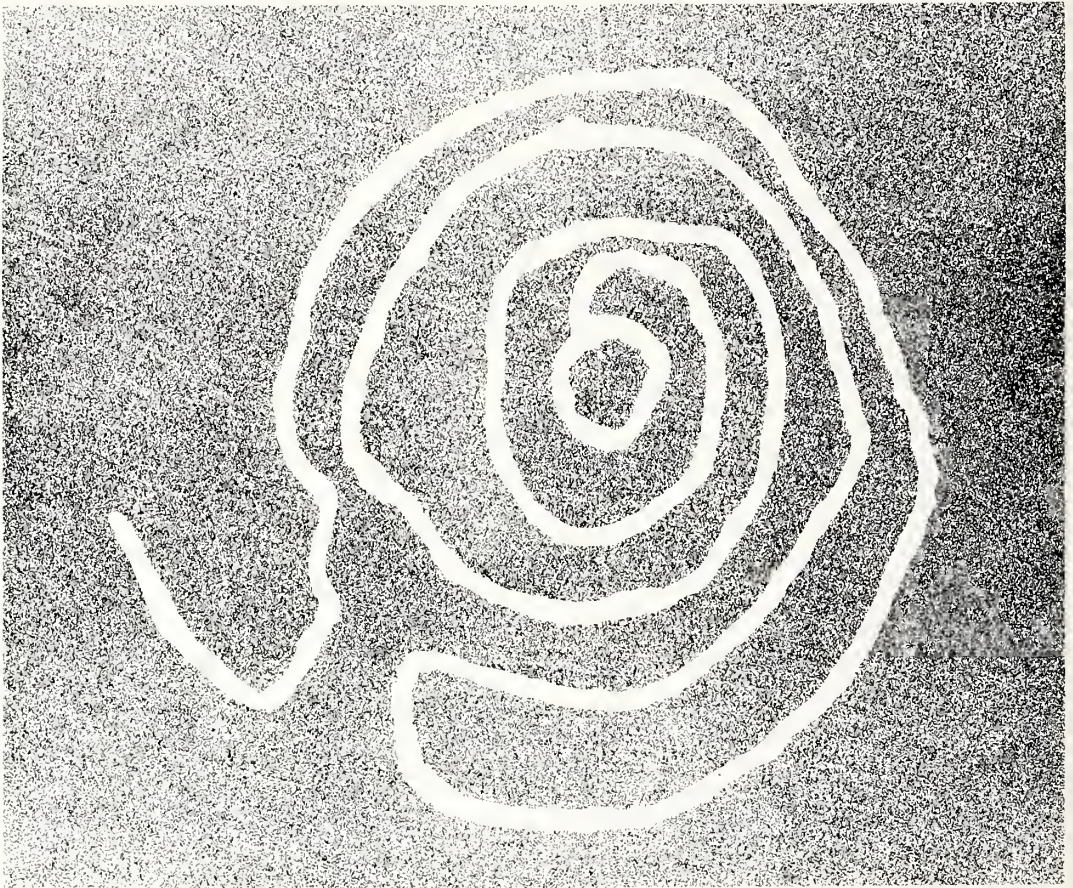


Fig. 4. Katrina (3).

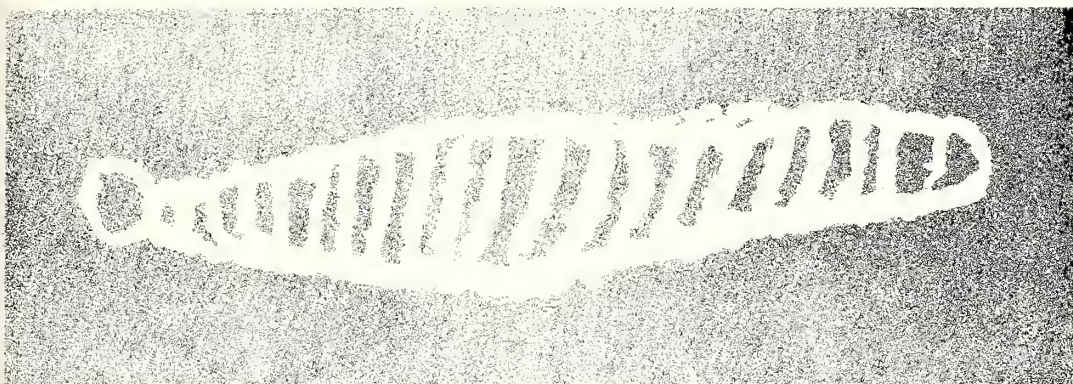


Fig. 5. Katrina (1).

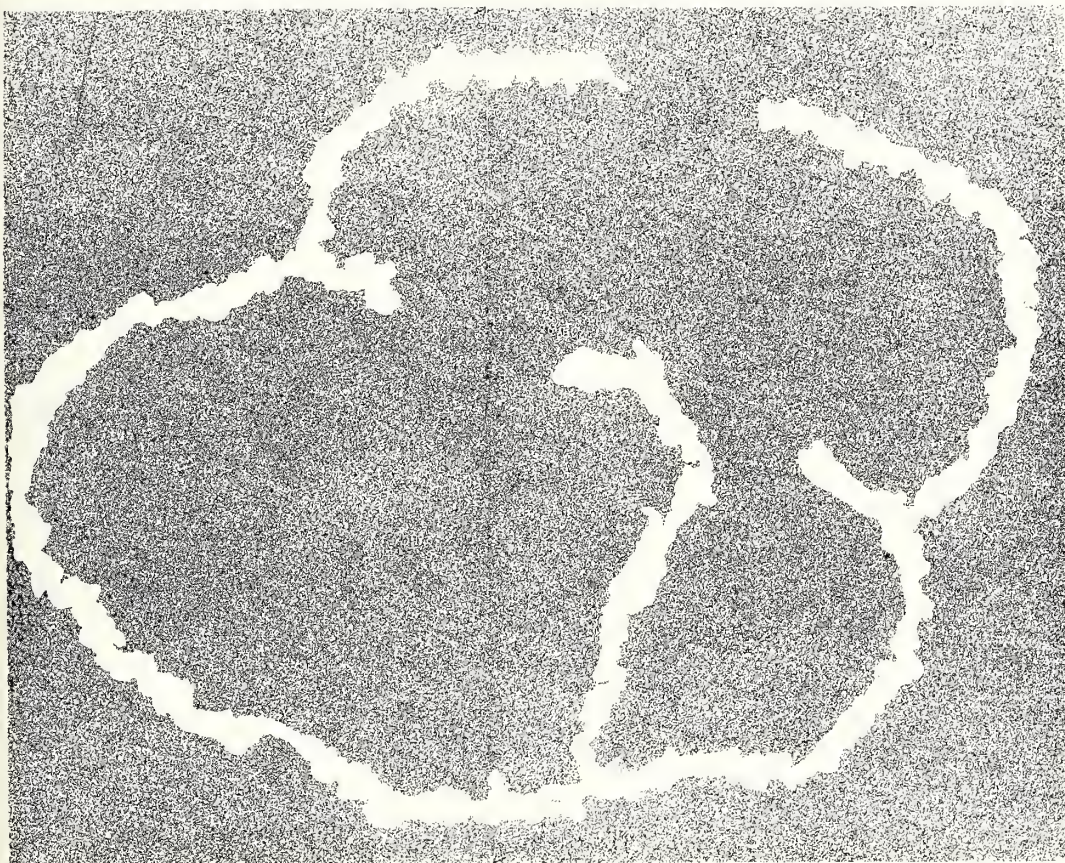


Fig. 6. Katrina (3).

Katrina: Engravings on a dolomite pan on the old "Pioneer Road" to Botswana and Rhodesia. There used to be a permanent fountain which has now dried up, but there is a borehole with brackish water near the pan. According to local tradition it was occasionally visited by Bantu from the Bulawayo area. The engravings belong to two periods, the older ones comprise spiral with short rays (fringe), circle with dot in centre and rays, oval with longitudinal line and rays, spiral (Fig. 4), oval with, several vertical lines (Fig. 5), circle with dot in centre and a line of dots following the outline, asterisk, circle with grid, oval with grid, maze, wavy line. They belong to the Middle Period. A number of these engravings have been re-worked in comparatively recent times. The younger engravings comprise mainly animals including a camel, circles and ovals in a composition to resemble the layout of stone kraals (Fig. 6) the ruins of which are on a nearby

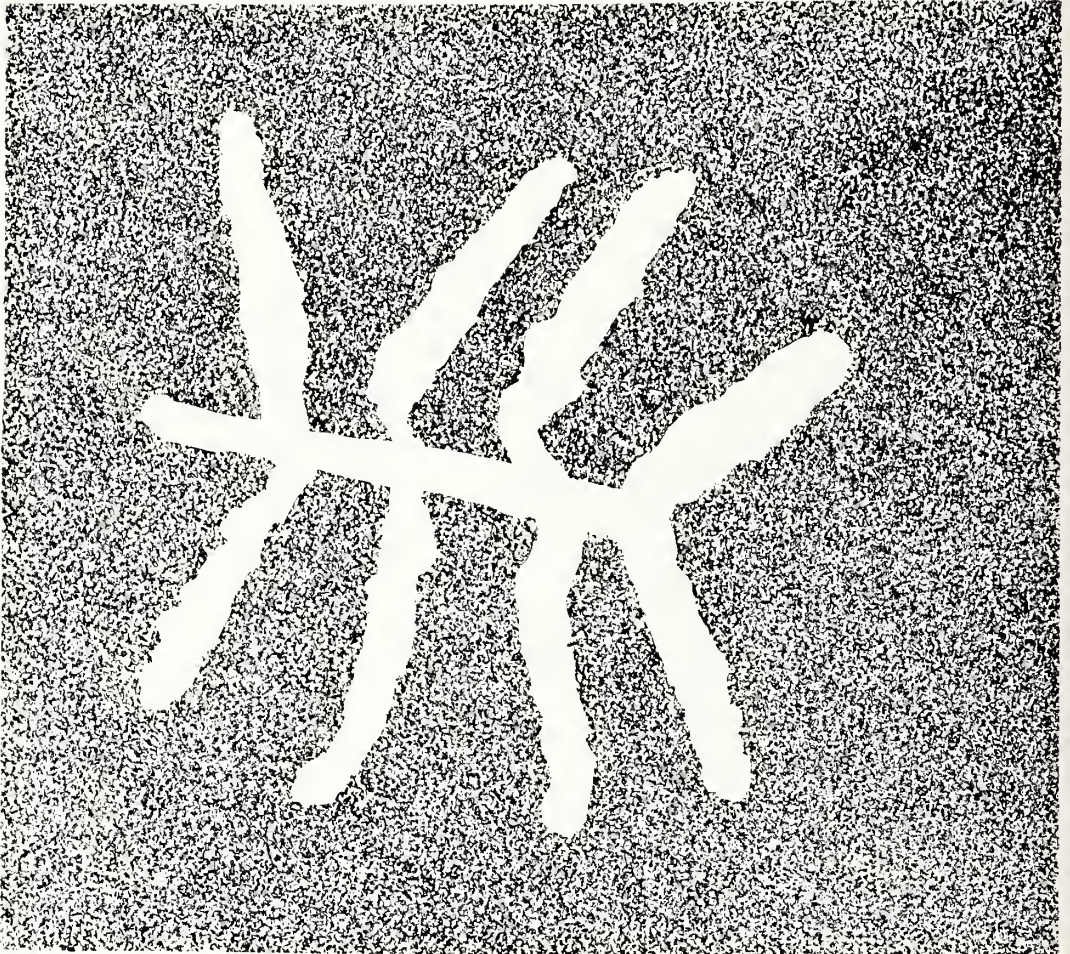


Fig. 7. Thlapin (1:1).

hill. They are of the Younger Period up to recent, probably the work of Bushman or Bushman/Bantu hybrids.

Mahakane: Two adjacent dolomite pans with two small waterholes cover an area of some 200 × 300 ft. On both pans are engravings of two periods: older ones comprising circle, concentric circle, spiral, maze. The younger engravings depict animals and men. On nearby ridges remnants of stone enclosures (kraals) built of banded jasper can be found, their walls still being up to 5 ft. high. The engravings belong to the Younger Period and the latest ones were made in historical times.

Thlapin: Two adjacent dolomite pans three quarters of a mile by 150 ft. extent, have engravings of two periods: an older one with concentric circle, ladder (Fig. 7), circle with rays. The younger group comprises lance-head, arrow-head, bow, maze, kraal, animal skin. The older group belongs to the Middle Period, the later to the Younger Period, some engravings dating to our present time.

Zoutfontein: The engravings are on an outcrop of diabase in a river-bed, distributed over an area of about 2 acres. Asterisk, semicircle, and maze (Fig. 8) are to be found. All engravings are of the same age and belong to the Middle Period.



Fig. 8. Zoutfontein (1)

Warrenton District

Nazareth: A site near the Vaal-Harts Dam where J. H. Power made copies in 1949 of ladder, grid, circle with rays. They belong to the Middle Period.

DISCUSSION

There are various designs which are fairly common in non-representational rock art:

- circle with or without a dot in the centre;
- circle with thick dot ("cup and saucer") (Plate 8);
- concentric circles;
- circles with groups of (often four) rays radiating on four sides;
- oval;
- oval with longitudinal or vertical lines;
- asterisk;
- rows of vertical lines;
- single and double ladders (Fig. 7), (Plate 13);
- wavy line;
- maze (Plate 5, Figs. 8, 11);
- grid (Fig. 14).

It was presumed that there were designs peculiar to one site only (Driekops Eiland I) which led to speculations often of a very far-fetched nature, linking them even with Mediterranean Mythology (Slack, 1962). Some of the designs found on rock-engravings are motifs which are still used to adorn various articles, e.g. knapsacks or aprons, in use by present-day Bushmen. The same patterns can be found in colour in shelters (see Part II), as already mentioned by Willcox (1965).

It is known from engravings of animals how excellently nature was "copied" and many non-representational motifs can be recognised as having been inspired by nature. Wilman's remark to this effect is contained in a footnote only, it is therefore repeated here: "Some (patterns) seem to have been equally suggested by the many strange devices painted and engraved by nature on the rocks of this area. Such as, for instance, coloured geometric designs on the shales, dendrides on the jaspers and sandstone grids and other raised patterns on the sili-cified crocidolites (asbestos) and an infinite variety of fantastic designs on the dolomites". To this one can add the tracks of snails under water (Driekops Eiland I, Fig. 9) string patterns (cat's cradles, Plate 1) or patterns on the sand, sometimes a complete set of concentric circles made by the wind with a single stem of grass. Far too much of our present-day knowledge and ideas have been projected into the representation of rock-engravings motifs. Engravings, for instance, consisting of adjacent circle segments occurring on dolomite of a former fountain (now a pan) at Katrina and Mahakane are found to depict the foundations of kraals (now in ruins) on the hills, about two or three miles distant. These remnants of stone enclosures of banded jasper are in places still up to 5 ft. high. The Vaalpens lived there together with Bantu and it may be of some interest to record that next to the pan at Katrina some iron objects of Tswana origin, also ostrich egg shell beads and pottery were found.

A question most frequently asked and a question to which scientists have been trying to find an answer is the age of the engravings. At the outset one has to admit that apart from the ones made by Europeans who engraved a date next to their initials one cannot give definite dates. There are a few exceptions, e.g. Khami in Rhodesia which dates back to the beginning of the 18th century. Here some of the stones used for the buildings are adorned with geometrical engravings. (Robinson, 1959).

The oldest engraving in South Africa, made by Europeans, is at Bergh Fontein in the Clanwilliam District. It was executed with iron tools and reads: O. BERGH 1682. It has weathered to the colour of the rock, but the contours do not seem to have suffered from three centuries of weathering (Plate 10). Below, another of the early explorers left his name: SLOFSBO 1712. This name and date can also be found in nearby Heerenlogement, a cave visited by numerous early travellers. As here they are protected against the hazards of climate and weather these engravings cannot serve as a guide to weathering. They look completely fresh, even where the chalk (obviously used by someone to obtain better photographs) is no longer evident (Plate 11).

In South Africa we have not yet a direct method to date the engravings. Therefore, the opinions expressed by various workers differ widely. Wilman (1933) as well as Holub (1890) considered 600 years the maximum age of any surviving rock-engraving, Willcox (1963) thinks 2,000 years the maximum possible time. Mason (1962) after a careful study of stone-age im-

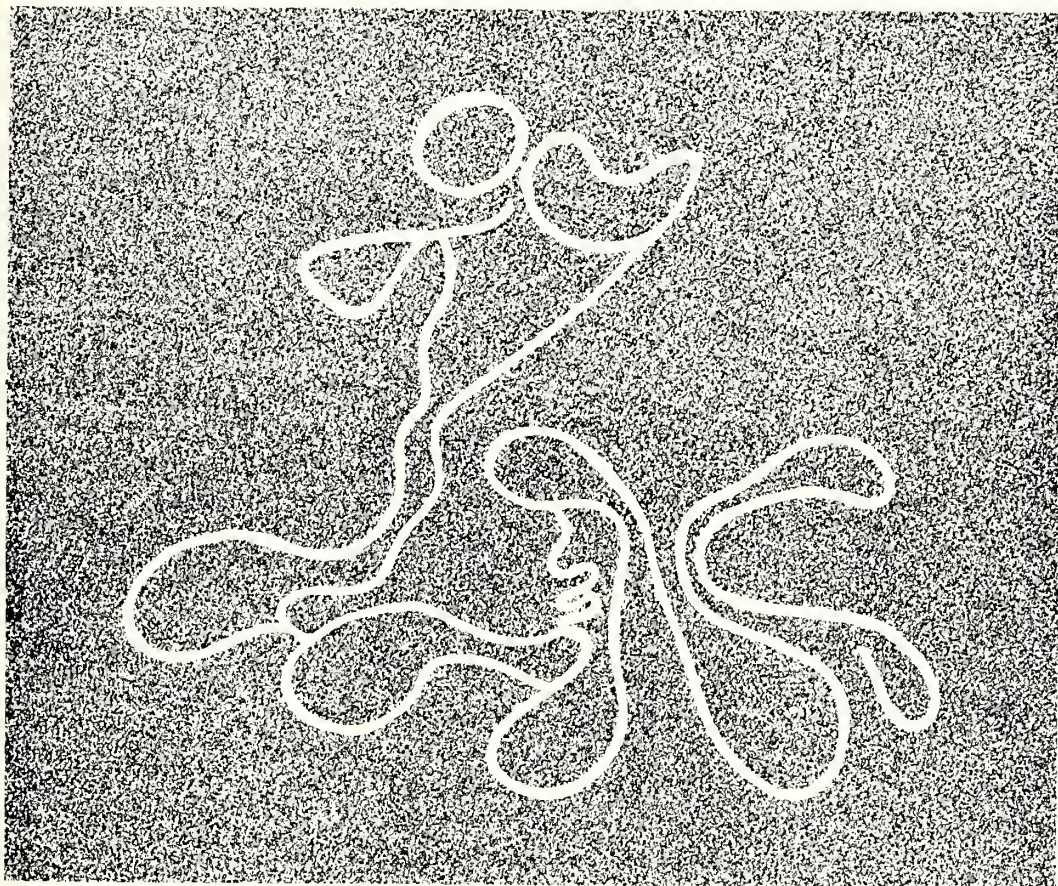


Fig. 9. Driekops Eiland I. Track of snails under water ($\frac{1}{6}$ actual size).

plements and engravings from Bosworth (Transvaal) comes to the conclusion that there the earliest engravings have an age of about 10,000 years. The late Prof. C. van Riet Lowe also expressed the opinion that the oldest engravings may be of Late Middle Stone Age time, that means 10,000 years for the oldest ones.

It has often been suggested that weathering would destroy rock-engravings in South Africa in the course of some hundred years. Weinert made a special study of weathering conditions in South Africa (Weinert, 1965). He found that in the Northern Cape, an area of summer rainfall the chemical and physical weathering is very slow. This makes Mason's earliest date seem probable. This assumption can also be supported by Radio-Carbon dates from Libya (Mori, 1965).

While no absolute dates are available in South Africa reference in this paper is only made to three relative datings:

- (a) Oldest Period;
- (b) Middle Period;
- (c) Younger Period.

An attempt is made to correlate these periods as follows: The Oldest Period comprises engravings that may date back to the earliest Smithfield A or even late MSA. It is generally accepted that non-representational engravings are not amongst the oldest ones (Mason, 1962). The Middle Period (Wilman's Style ii and iii) belongs to Smithfield B as proved by Willcox (1963). It is younger than 8,000 years. The Younger Period is contemporaneous with the Iron Age. Yet it must not be assumed that the engravings were executed with iron tools, although iron lance-heads etc. are depicted.

Two engravings from Rooikraalfontein differ markedly from other non-representational ones under review. Usually designs are composed of single lines, at Rooikraalfontein of double lines, one pattern consisting entirely of triangles. It might therefore be presumed that the artist was not a Bushman.

Prior to about 1910 (Stow, Bleek, Orpen, Holub, Poech, Tongue) it was generally agreed that rock art (paintings and engravings) was of Bushman origin. In 1910 Prof. R. von Luschan (Zelitzko, 1923) the then director of the Berlin Ethnological Museum voiced the opinion that the Bushmen were not the artists. His idea found a strong following in the next decades and only after World War II it was stressed by Van Riet Lowe (1952) and others that the Bushman could be considered the originators of Rock Art in Southern Africa. Engravings dating to the middle of the last century may have been the work of Bantu or Bantu/Bushman hybrids (Willcox, 1963) probably in the case of Mahakane and Katrina. Though Breutz (1959) states that nilotic Pre-Bantu (Vaalpens and Kattea) were the artists. There is a camel depicted at Katrina which is an illustration of engravings made in our time. The Police Station and Camel Post was only established there after the Anglo-Boer War.

The time needed to execute an engraving whether representational or not is considerably shorter than hitherto assumed as Sierts (1968) proved by his experiments, e.g. 10 to 20 minutes.

PART II

PAINTINGS

THE SITES

The non-representational paintings are found in caves or under overhangs in the Kaap Plateau, the Langeberge, Skuurweberge, Kuruman Hills and the asbestos area in the north of the Vryburg District. The sites are listed here under the name of the farm on which they occur.

Barkly West District

Rietfontein: On the portion of this farm belonging to the Union Lime Co. (Ulco) is a deep kloof in the Kaap Plateau where numerous caves and shelters occur. A stream runs through this kloof forming a waterfall after heavy rains, even if it dries up open water can be found all the year round. Bushmen must have lived there until fairly recently as 4 sticks wedged into the vertical rock some 3 to 4 ft. apart can still be seen. They were used to collect honey from otherwise inaccessible hives.

On the southern bank of the kloof three localities contain non-representational paintings in predominantly red, maroon, black, white and some blue.

(a) Under a 2 ft. overhang an area stretching some 10½ ft. horizontally contains paintings of tectiform design (Fig. 10), horizontal line with vertical strokes downward, grid, short converging lines, vertical parallel lines, vertical parallel rows of 3 or 4 dots, parallel horizontal strokes, all in rather faded red.

(b) A cave some 24 ft. deep in parts, 90 ft. long and 15 ft. high with an uneven floor (bed rock) contains paintings along nearly the whole wall. They are rather faded, mostly vertical stripes, rows of dots, ladder, cross in rectangle, all in red as well as a grid in maroon. An area of about 4 ft. may contain paintings obscured by soot therefore unidentifiable. At the northern end of this cave a block protrudes which has a multitude of paintings (Willcox, 1964) in white, red, black, of dots, vertical strokes, vertical lines with horizontal upward strokes, ladder, tectiform design as well as parallel upward strokes on vertical line in faded blue.

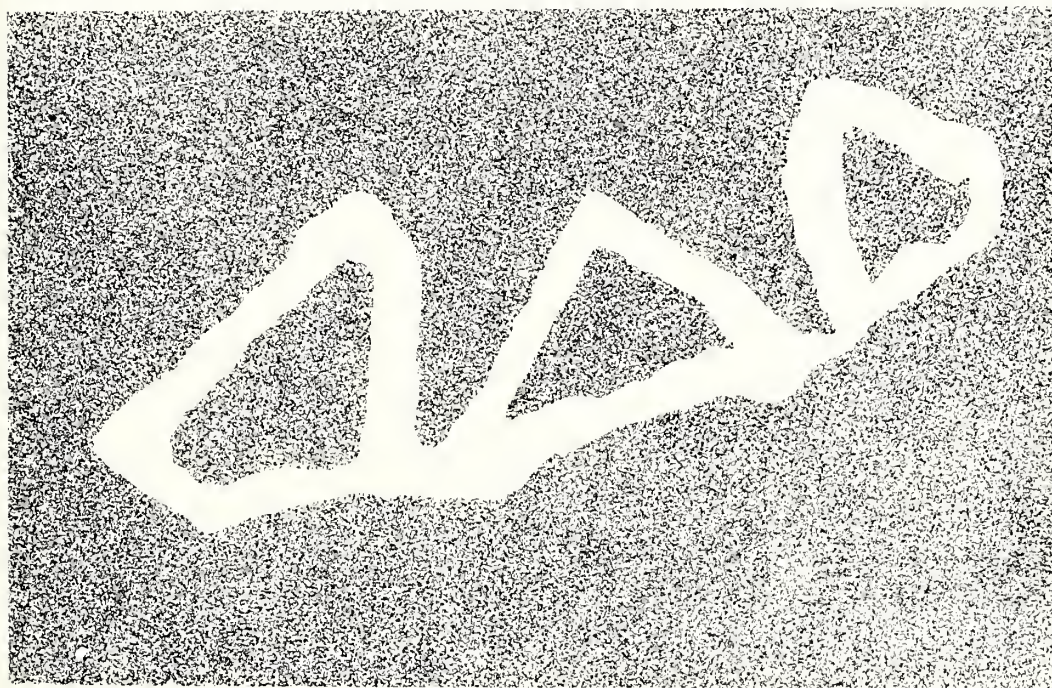


Fig. 10. Rietfontein "a" painting in red. (½)

(c) A cave facing north 90 ft. above the stream is 20 ft. long, 16 ft. deep from 3 to 5 ft. high. To the left is a big stalactite with faded vertical lines in red, the whole area is covered with designs in black, white, maroon, red, of ladder (Plate 12), horizontal lines with upward or downward vertical strokes, grids in monochrome as also white grid with horizontal stripes in black. In an area of 33" \times 28" the calcrete had been removed from the roof of the cave on which the following can be seen: a white horizontal line crossed by maroon vertical strokes, black and white alternating horizontal strokes, 2 rows of parallel vertical dots in red near 2 circles connected with line also in red (Plate 13), 2 red grids drawn by lines only half the usual width, row of dots arranged to form an obtuse angle, maze (Fig. 11) on the roof of the cave where calcrete had



Fig. 11: Rietfontein "c" (1). Painting in red, black, grey: white / red, black / black, grey / grey.

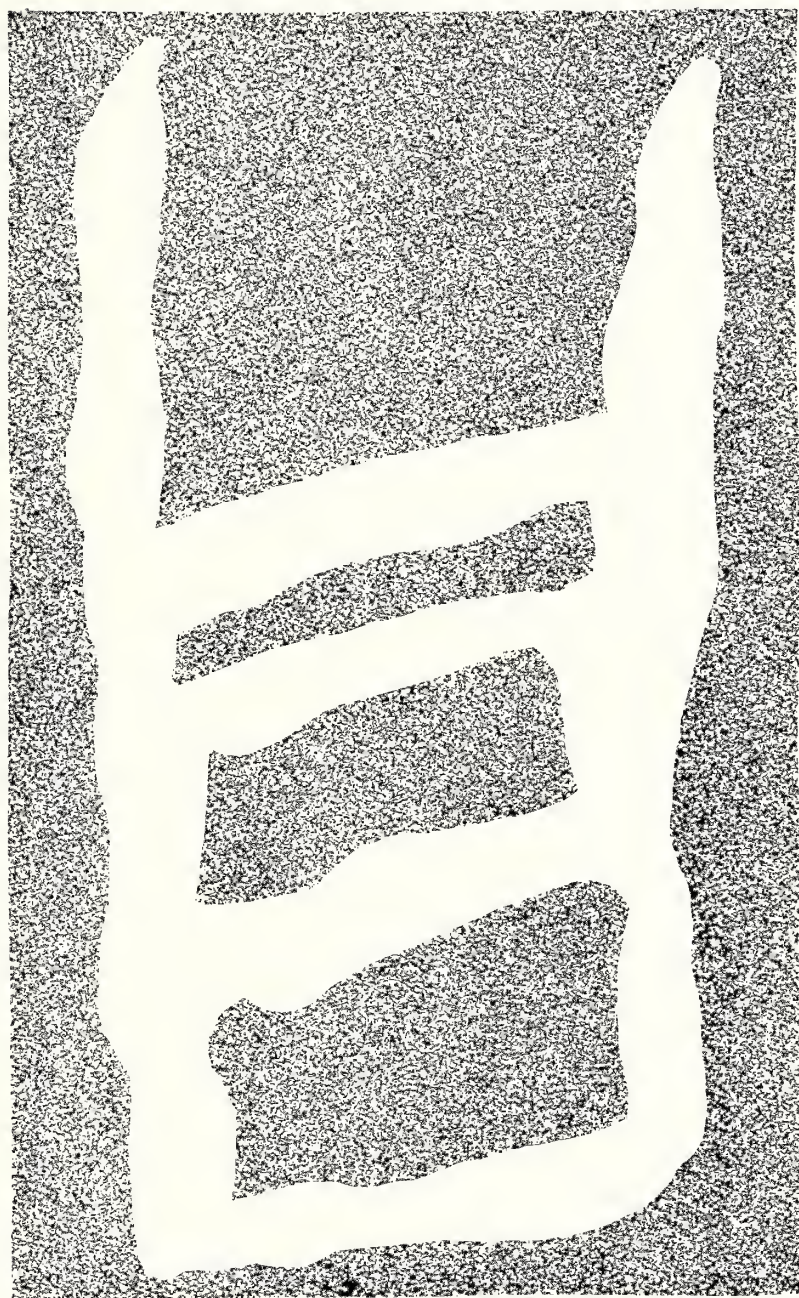


Fig. 12. Wonderwerk Cave. Pattern in red (3).



Fig. 13. Wonderwerk Cave. Pattern in red (4).

been removed, in black and red, if part of the background incorporated into the pattern is taken into account a polychrome pattern ensues. The colours in this cave look fresh, they are the ones best preserved in the area under discussion, because they are sheltered from the hazards of climate and weather, unremoved calcrete forming an ochre background.

Hay District

Kogelbeen: At the entrance to this well-known cave in the Kaap Plateau the following can be seen: a grid in white, ladder in white, white horizontal line with white and red upward strokes.

Laer Kareefontein: At the entrance to an extensive cave (Plate 14) on the Kaap Plateau near a rivulet with water nearly all the year round parallel vertical strokes in red and black and a tectiform design in red are to be found.

Herbert District

Clear Water: On this farm are several caves and overhangs in the Kaap Plateau facing east, in one of these overhangs, parallel vertical strokes in black and red occur.

Dickbosch: Under an overhang near a rivulet in the Kaap Plateau facing north strokes and wavy lines in black and yellow occur.

Voorspoed: In a big kloof of the Kaap Plateau with open water nearly throughout the year 3 overhangs facing north have parallel vertical lines in red.

Gordonia District

Dinah's Rust: Above the entrance to a small cave near Mt. Innes in the Skuurweberge are vertical lines in red, a small grid in white is painted over part of these. Both colours faded.

Kuruman District

Wonderwerk Cave: In this cave in the Kuruman Hills, Maria Wilman copied, it is presumed, all paintings there in 1921. They include in addition to game animals 5 patterns: double ladder in red (Fig. 12) short horizontal line with 2 strokes downward and 4 strokes upward (Fig. 13) in red, 3 short parallel vertical lines and grid in red, (Fig. 14) horizontal line with downward strokes and tentacles at right end in yellow (Fig. 15). Today the paintings are hardly visible, they have been destroyed by vandals.

Postmasburg District

Andriesfontein: In a cave facing west in the Langeberge 60 ft. above a rivulet a tectiform design in red, 2 parallel U-shaped lines in black, oval with grid in black, ladder in black, horizontal lines with 3 parallel vertical lines could be seen.

Meidekop: In overhangs on both banks of a narrow kloof approx. 10 miles west of the Langeberge which carries plenty of water during the rainy season and holds water in shallow depressions for a long time, the following very faded designs could still be recorded:

(a) On the south bank in an area of some 8 ft. in length designs in maroon or red could be seen, but they were so faded that no definite statement as to their shape can be made.

(b) On the north bank distributed over an area of about 83 ft. in length the following could be distinguished in maroon: tectiform design next to meander motif, rectangular grid, parallel horizontal lines the lowest of which has three pairs of double vertical lines, wavy lines, maze, oval with longitudinal line below a meander motif, horizontal line with 3 upright vertical lines, bold W-like design with row of small dots along left outer line, bold horizontal line with two short vertical lines on left side, rectangular upright grid, ladder. Black wavy lines over maroon oval with longitudinal lines.



Fig. 14. Wonderwerk Cave. Pattern in red (4).

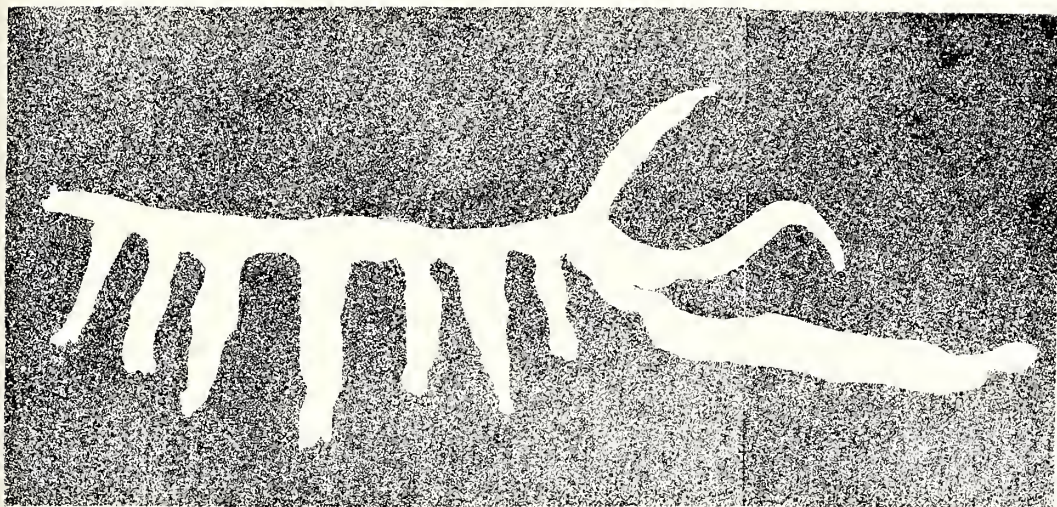


Fig. 15. Wonderwerk Cave. Pattern in yellow ($\frac{1}{3}$).

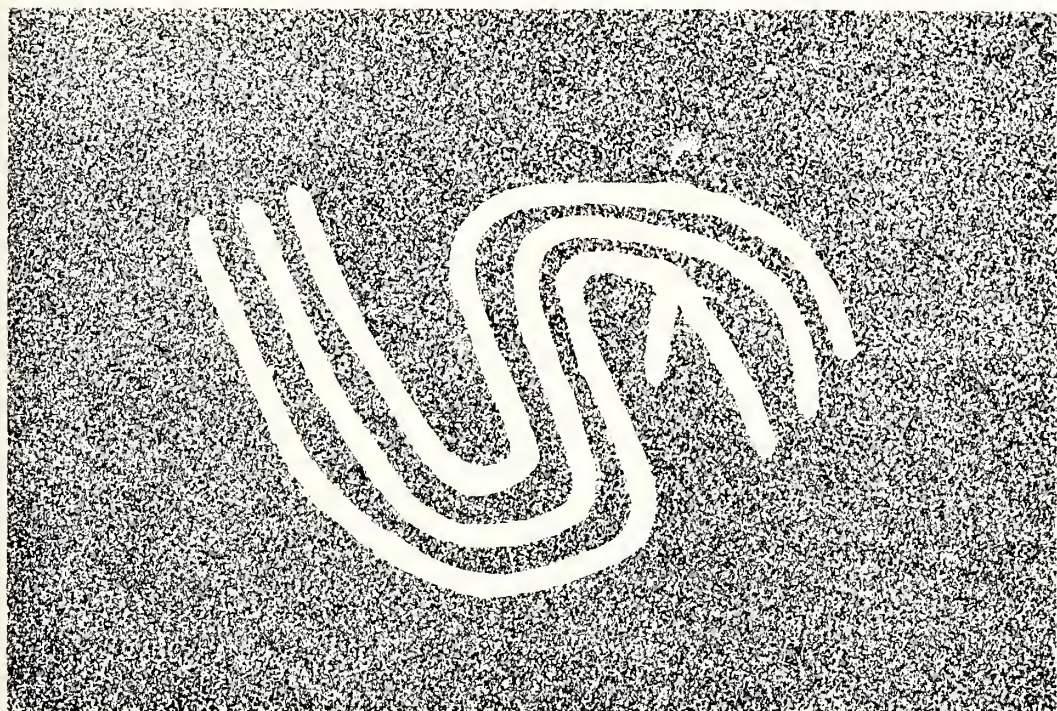


Fig. 16. Toto Pattern in red ($\frac{1}{3}$ actual size).

Toto: Under an overhang on an inselberg in the Langeberge a grid in black and 3 parallel S-shaped lines in red (Fig. 16) could be recorded.

Vryburg District

Dithakwaneng Reserve: This site (Plate 15) is referred to by Schoenland (1896) as "Mostert's Farm" and as "Lochnagar", "Brussels Spruit" by M. Wilman. There are two sites on the banks of the Mahura's Spruit.

(a) On the west bank facing (Plate 15) north east under an overhang in an area of 30 ft. in length the following in faded red could still be identified: rectangular grid, horizontal line with short upright vertical strokes, parallel vertical strokes, multiple grid, oval grid, vertical lines with parallel horizontal lines towards the left. There are also some remnants of black paint, but it is impossible to say what they represent, perhaps also some in maroon, so no longer to be distinguished.

(b) About 350 yards downstream on the east bank under a shallow overhang facing west the following could be distinguished: horizontal stroke with vertical upright as support for short wavy line (Fig. 17) short upright strokes, maze, vertical parallel curved lines (Fig. 18) below a tectiform design the lines of which are only about half the width as usual a pattern consisting of rows and vertical dots over two semicircles, parallel curved strokes, cross. All in faded red. Tectiform design in yellow, hook in red, horizontal red double line continuing in dots, horizontal line with 3 upright strokes in red, horizontal line in yellow over red vertical line forming pattern reminding of modern street plan.

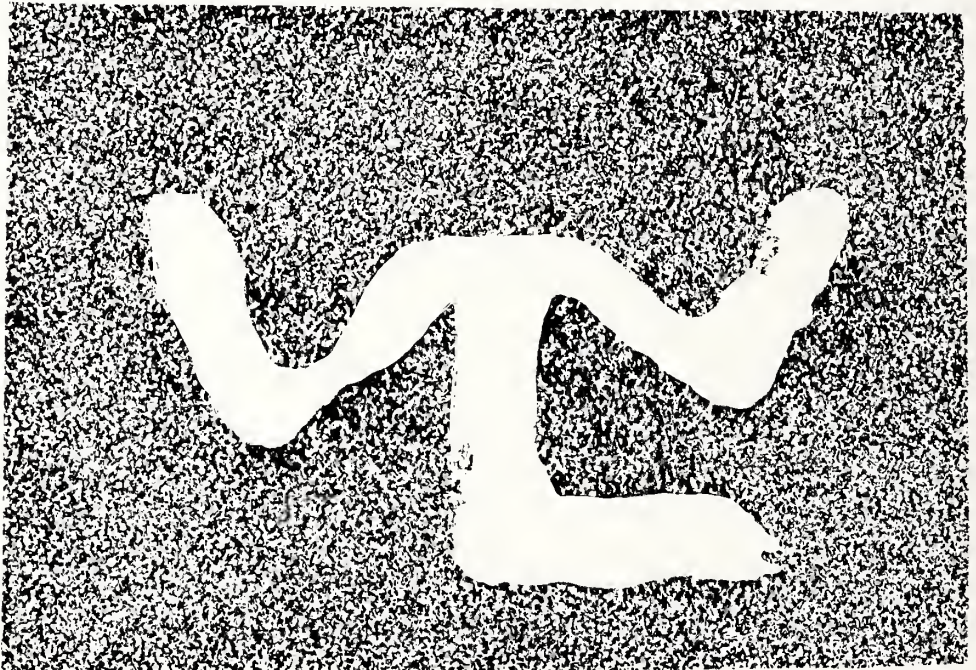


Fig. 17. Dithakwaneng "b" painting in red. (1:1)

Mahura's Spruit has its source on Lochnagar farm whose original name was "Choblok" which means animal droppings which accumulated there in former times because it was a very strong permanent fountain where game came to drink in great numbers.

Spitzkop: Above the entrance to a small cave near Pomfret Mine an area of about 10 ft. in length is densely covered with wavy lines very similar to the engravings on nearby Katrina in black and red, vertical strokes in red and black also occur.

DISCUSSION

Some of the 13 painting sites mentioned have been known for over 70 years. The persons who first reported their discovery often described the signs as resembling the "Phoenician Alphabet" (e.g. T. J. Carlisle, 1909 quoted by Wilman). This in turn led to much confusion and speculation concerning non-representational designs. (Slack, 1962, Du Toit 1967).

At the Monthly Meeting of the South African Philosophical Society in Cape Town, on 26th August, 1896, a paper was read and photographs shown on behalf of Dr. S. Schönland, the then director of the Albany Museum, Grahamstown on paintings he had found on "Mostert's Farm" in the Vryburg District. "... They were designs which seemed to indicate the existence of some kind of writing among the Bushmen hitherto entirely unsuspected ..." Schönland's assumption gave rise to a line of interpretation which apparently prompted even Van Riet Lowe to discuss in detail this question in connection with the engravings on Driekops Eiland (1952).

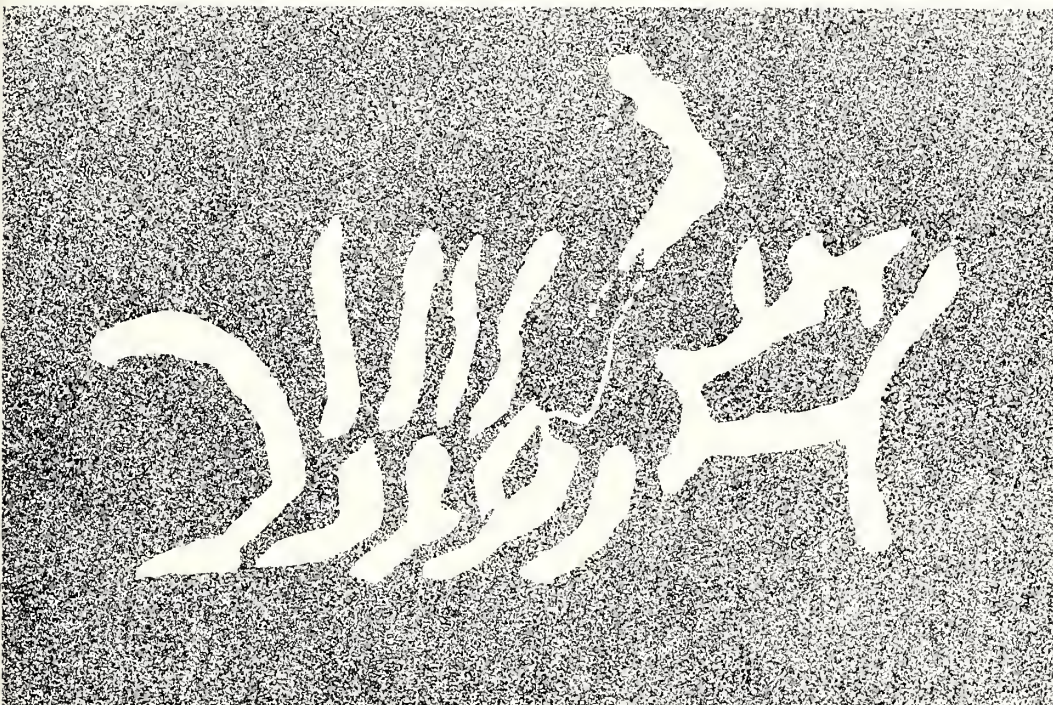


Fig. 18. Dithakwaneng "b" painting in red. (1)

As may be seen from the art content of non-representational engraving and painting sites the designs are very similar, a fact already mentioned by Willcox (1964, 1965).

We know from G. B. Silberbauer's "Bushman Survey" (1965) that the Bushmen to this day adorn various articles with patterns, but what is really remarkable in this connection is his report (on pp. 85) and picture of a G/wu girl after her puberty ceremonies showing tattoo marks. These show the same vertical lines and motifs known from rock-engravings, or paintings in or near shelters. Silberbauer reports: "... Shouting and laughing they run her in a circle and then back into the seclusion hut. This is a 'rainstorm' and the noise is the excitement and joy of 'getting wet' ". Rock-engravings are always found near waterholes or fountains, but non-representational motifs are sometimes directly in a stream or riverbed: it may be therefore that the designs indicate water or rain or have some connection with puberty ceremonies. As some of the paintings are in areas into which the Bushmen retreated before the oncoming Bantu (from the north and east) and the Hottentots, Korana and Griqua (from the south and west) they kept the motif and executed it in paint if no suitable material for engraving was available. We have here the example of the engraver turned painter. (In the De Aar District there are instances of representational art which show the painter turned engraver. Foek 1967). It should be stressed here that although some of the designs may be of a symbolic nature or are perhaps connected with Bushman folklore or myth they are peculiar to them and have no connection with similar designs in other parts of the world. See also Willeox 1964.

The colours used in executing these patterns or line drawings are red, maroon, black, white, yellow and blue in one instance. As they are mostly found in shallow shelters and thus exposed to severe weathering they are very faded. They seemed to have been executed with a finger daubed in paint and are therefore referred to locally as "finger marks". There are a few exceptions where a tool must have been used to execute the paintings as proved by their accuracy and the lines only being about 5 mm. in width, in contrast to the usual width of 15 to 20 mm. They are mostly monochromes, sometimes bi-chromes and in one instance a polychrome was observed.

PART III

GENERAL CONCLUSIONS

Non-representational motifs in rock art occur in a wide area in the Northern Cape. On 28% of all engraving sites north of the Orange River these predominate, while painting sites show non-representational motifs only, with one exception. The paintings were all the work of the Bushman and it is suggested here that they originally were engravers who turned painters where no suitable rock for engraving was available.

The various designs are ubiquitous. None of them is confined to a special site. They also occur on sites with predominantly representational engravings—which were not included in this survey. The term non-representational was used throughout this paper as it is an accepted one by workers in this field. It might be presumed that the designs had a specific meaning to the Bushmen though not in the sense of an alphabet or writing, some of them are obviously connected with water.

REMARKS

The question as to the best method of preservation is often asked. From what the author saw in an area from Mafeking to Carnarvon—Richmond—Gestopte Fontein—Mafeking he came to the conclusion that the climate is the least hazard, the most destructive influence is exerted by man. In the McGregor Museum in addition to Stow's copies (which date back 100 years) there are also photographs taken in 1906 which served as comparative material with the originals *in situ*. The only changes were the names or initials scratched over them by various visitors. The paintings in the Wonderwerk Cave near Kuruman are destroyed, they have been

used as targets for shooting practice, painted over, in some instances with aluminium paint. One must be very grateful to M. Wilman for her meticulous work as her copies in the McGregor Museum are the only existing records of representational paintings in this area.

Péringuey, as long ago as 1907 observed that even paintings withstand the hazards of climate at the coast. His observations refer to paintings near George which were copied in 1837 and re-copied by M. Wilman in 1907. He writes: "On comparison with the original publication neither the outline nor the colour of the pigment had altered in the least."

There are known instances where boulders with rock-engravings were used as building material and later when alterations were carried out the engravings were covered over with plaster. The main concern is therefore to protect rock art from human vandals.

ACKNOWLEDGEMENTS

To the Director of the McGregor Museum I feel indebted for advice and assistance, to Mrs. A. Bazzard for preparing the drawings, to several colleagues for information willingly supplied. The farmers and interested persons who kindly helped with guidance to the sites, transport, hospitality, and in many other ways are too numerous to mention here. It was most gratifying to note the keen interest they take in rock art which benefitted the work considerably. To everybody the sincerest gratitude is expressed herewith. A grant-in-kind from the Deutsche Forschungsgemeinschaft was of great help in carrying out the fieldwork.

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Plate 1. Nickerkshope II.



Plate 2. Rocklands. Compare Plate 4 Driekops Eiland.



Plate 3. Vaalpan II.

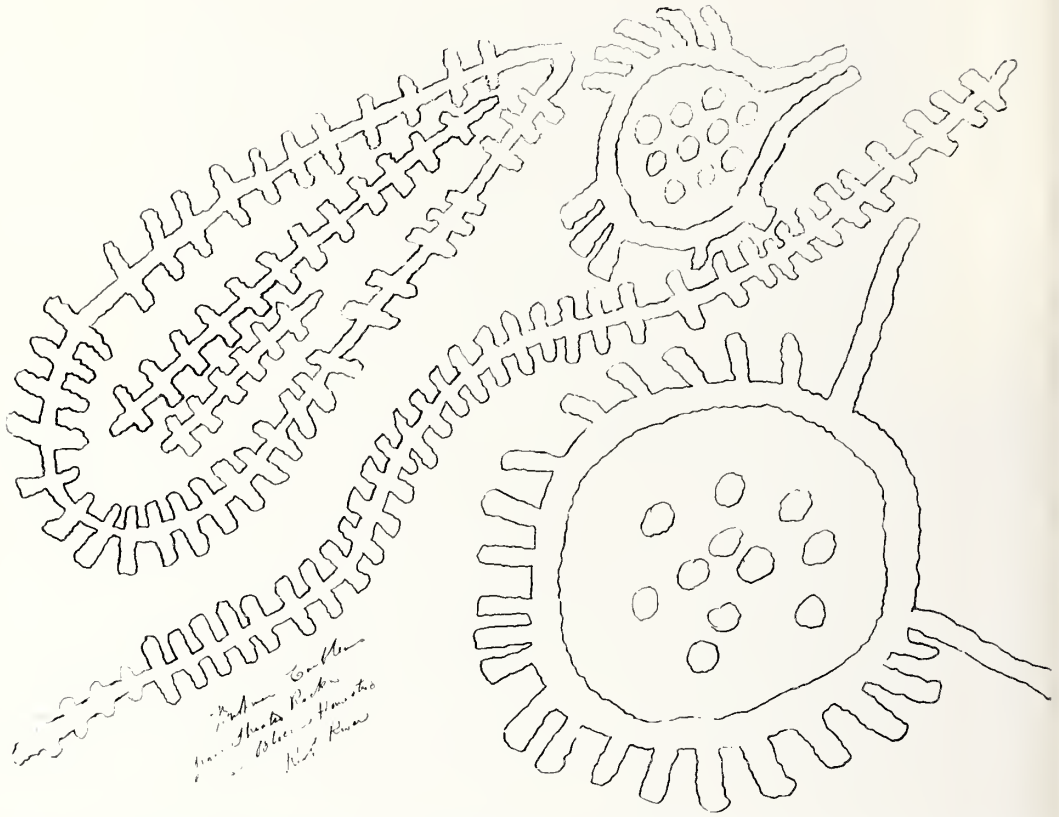


Plate 4. Driekops Eiland, copy by Stow. Caption reads: "Bushman Emblems from Striated Rocks near Bloems Homestead Riet River".



Plate 5. Driekops Eiland II.



Plate 6. Rooikraalfontein.



Plate 7. Rooikraalfontein.

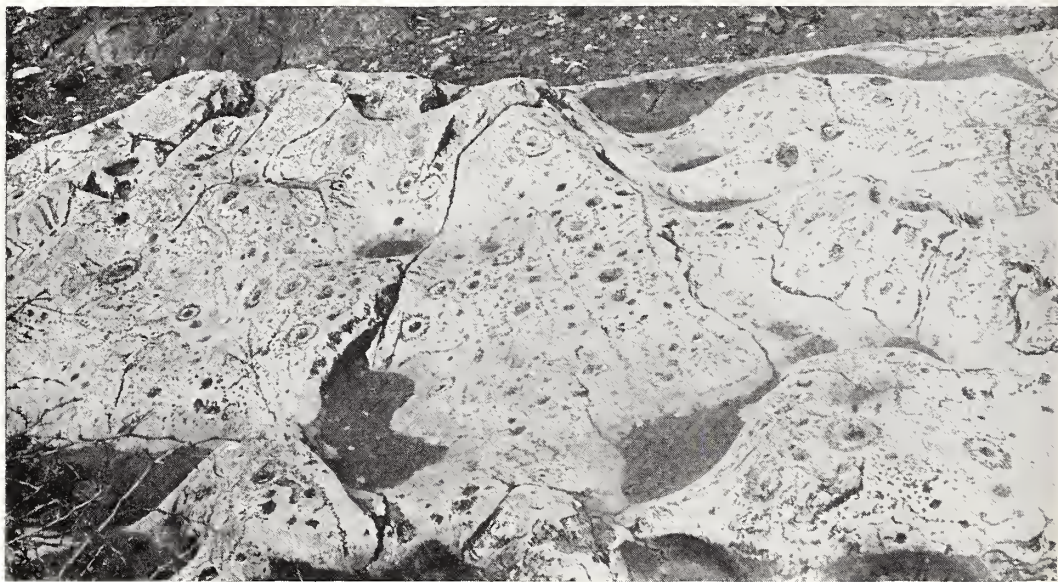


Plate 8. Beeshoek.



Plate 9. Bernau "cups".



Plate 10. Bergh Fontein.

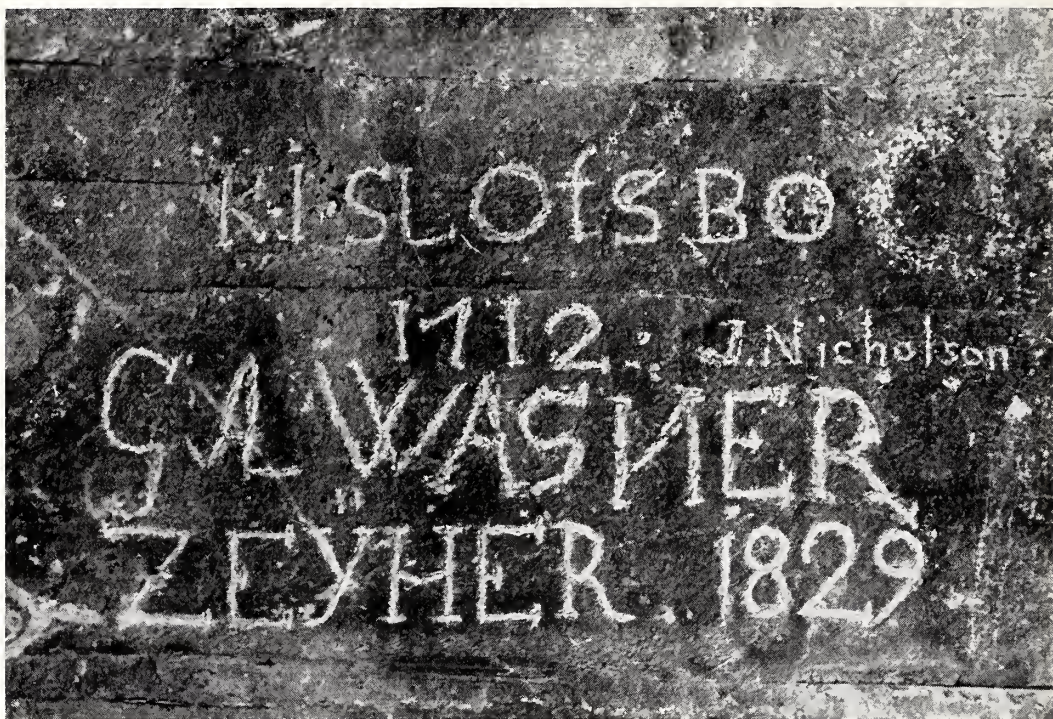


Plate 11. Heerenlogement.

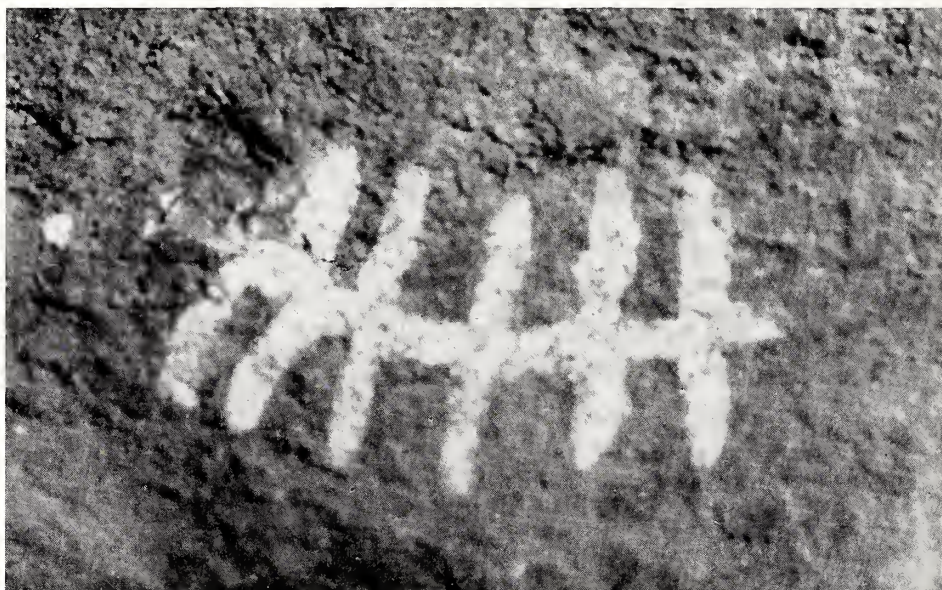


Plate 12. Rietfontein "c" painting in white ($\frac{1}{2}$ actual size).



Plate 13. Rietfontein "c" paintings in red ($\frac{1}{4}$ actual size).



Plate 14. Laer Kareefontein.



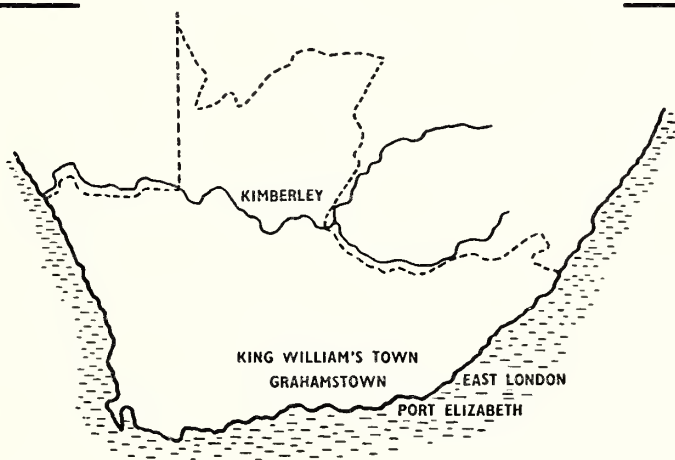
Plate 15. Dithakwaneng.

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ANNALS OF THE CAPE PROVINCIAL MUSEUMS

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The southern elephant seal, *Mirounga leonina*, on South African coasts

by

G. J. B. ROSS

(Port Elizabeth Museum)

From time to time, single specimens of the Southern Elephant Seal *Mirounga leonina* (Linnaeus) are recorded on the South African coastline. Their occurrence is sporadic, and only 14 records over the last 50 years are presented here. However, these supply sufficient data to give some comment on their occurrence in relation to the breeding season and migration.

Between 1919 and 1937 Port Elizabeth Museum obtained three specimens from Algoa Bay:

- (1) Feb. 1919 Swartkops River Mouth; adult male. Skull only.
- (2) Jan. 1932 Humewood, Port Elizabeth. Skeleton mounted in museum. Although this specimen is registered as a female, its length of 12 ft. could indicate a male. It is considered as sex unknown.
- (3) Jan. 1937 Algoa Bay. Listed by Roberts (1951) as a female. Incomplete skeleton now in Transvaal Museum, Pretoria.

Five records are given by Kettlewell and Rand (1955). Four males were reported from the Cape Peninsula in March, May 1949 and February 1950, and also from Knysna in January 1953. They also recorded the first known birth of a pup on the South African coast near Cape Agulhas in October 1953. The cow was seen suckling her pup, which was estimated at three to four days old.

Another male was sighted at sea off Saldanha Bay in January 1955 by Dr. J. R. Grindley (pers. comm.).

Photographs in the files of the Eastern Province Newspapers show a male that was hauled out in Port Elizabeth harbour, June 1957, and another male at Swartkops River Mouth in December 1964. This latter specimen was badly gashed in the neck and was subsequently shot.

More recently, three animals of unknown sex have been reported: Summerstrand, Port Elizabeth, in September 1967, swimming offshore; at Nature's Valley, in February 1968; Swartkops River Mouth in June 1968. This last animal was estimated at nine feet in length.

DISCUSSION

The nearest breeding rookeries of the Southern Elephant Seal are the Prince Edward Islands (including Marion Island, which has an estimated herd of 10,000 animals), Tristan da Cunha and Gough Islands. These are over 1,000 miles south and 2,000 miles west respectively.

The origin of the South African specimens is a matter of speculation. One would expect that the majority of these animals have migrated from the Prince Edward Islands since the distance is some 1,000 miles less than from the rookeries to the west. However, animals moving north from the southern rookeries would have to cross the Agulhas Current and its return current joining the West Wind Drift. Those moving east from Tristan da Cunha would be assisted by the West Wind Drift, at least until they reached the complex system of currents and eddies south-west of the Cape Peninsula.

Perhaps further indications of their westerly origin are the records from seal islands off Luderitz, South West Africa (Kettlewell and Rand, *ibid*) and St. Helena (Fraser, 1935), presumably animals that have been carried up the coast by the Benguela Current.

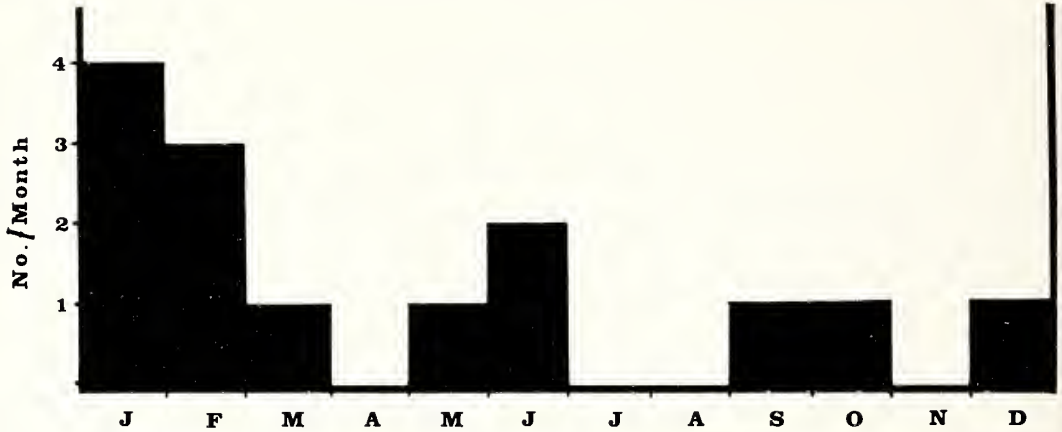


Fig. 1 The monthly occurrence of Southern Elephant Seals on the South African coast.

Fig. 1 shows the monthly records of Elephant Seals on the South African coast, in which the most striking feature is the predominance of summer records, with almost half the records in January and February.

A similar situation is found in the Rockhopper Penguin *Eudyptes crestatus* (Miller), which breeds on the same islands as the Elephant Seals from October to February. Of the 14 records documented by Donnelly (1965, 1967), 10 are in January and February.

A further feature of the Elephant Seal records is the greater number of males; only two possible and one authenticated females have been recorded. The records can be correlated to a point with the breeding and moulting periods as given by Harrison and King (1965). In August, the bulls come ashore at the rookeries to establish territories, followed two weeks later by the cows. The pups are born after a week and are suckled for a month. Mating, however, occurs some 18 days after the birth of the pups, and the harems start to break up. Presumably at this time the bachelor bulls as well as the harem bulls start to leave the rookeries. After a period at sea, the cows come ashore before the bulls, in April and May for the annual moult. The bulls, therefore, are away from the rookeries for several weeks more than the females between breeding and moulting, at a time when there are the greatest number of records on the South African coast.

While the summer peak in the records can be explained, there is no way of accounting for the lack of a winter peak, when the animals are also absent from the rookeries. It is thought that the herds migrate to lead a pelagic life near the pack ice in winter; whether this migration is of a more "compulsive" nature than the movements of the animals in summer is unknown. While all the records on the South African coast may be regarded as animals that have strayed from their normal limits, the predominance of summer records is probably a reflection of more haphazard movement around the rookeries in summer.

ROSS: THE SOUTHERN ELEPHANT SEAL

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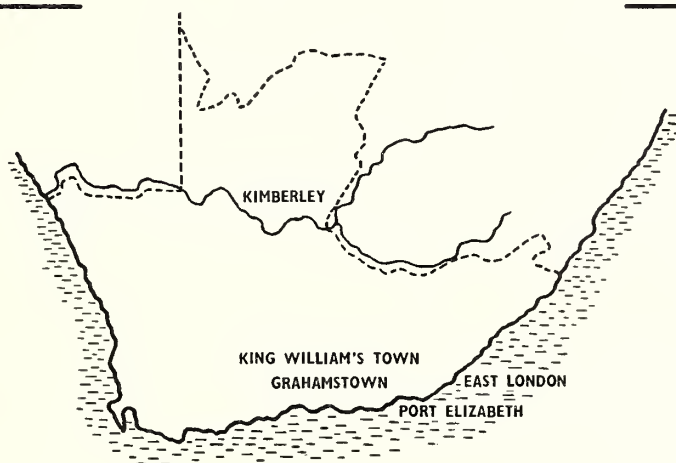
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Melkhoutboom Cave, Alexandria District, Cape Province: a report on the 1967 investigation

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INTRODUCTION

Melkhoutboom Cave (25° 47' E; 33° 19' S) is a large cave in a sheltered kloof in the Zuurberg range and was excavated in part by John Hewitt (1931). It has been perhaps most noteworthy for the preservation of plant remains in an archaeological context and for the record of small scrapers retaining traces of mounting mastic that were found there (Clark 1959). The 1967 excavation was of a limited scale and designed as a preliminary investigation, further work being planned at the site in 1969. The aims were twofold: firstly to obtain samples of plant remains for analysis and secondly to gain information on the cultural sequence represented. The collections available for study from the 1930-1 excavations were not adequate in themselves to provide an assessment of the site although they are valuable auxiliary samples.

A separate report has been prepared on the plant remains from the site (Deacon *in press* Pan African Congress for Prehistory and Quaternary Studies, Dakar 1967). The range of plant remains identified is similar to that recorded from Scott's Cave (Deacon, H. J. and Janette Deacon, 1963; Wells, 1965) in the Gamtoos Valley. This is of some importance for the possible bearing it has on the ecology of the later Stone Age groups inhabiting the Cape Folded Belt. This report is concerned with the archaeological results of the 1967 investigation. It will be some time before results of future planned work become available and it has been considered worth while to publish some statement on the preliminary phase of the investigation.

PREVIOUS WORK

Although a reasonably detailed description of the site is given by Hewitt (*op. cit.*) the main observations from the earlier report are given here with comment as an introduction. Familiarity with the site and the nature of the deposits makes the 1931 report more meaningful and here as elsewhere it is apparent the pioneer work of Hewitt was of a good standard. Three cuttings were made in the 1930-1 excavation, one located in the centre of the cave running from back to front. This was the main or (ii) cutting and was eight feet long and three feet wide. A second cutting was located in the rear of the cave (cutting i) and a third (iii) on the south side (grid ref. 10/45 approx. Fig. 2). Both these cuttings are smaller than the main excavation and were approximately three feet by three feet. Some material in the collections is labelled as from a hole near the entrance and this may indicate a further small excavation. All cuttings were excavated to bedrock and deposits which proved to be some six feet thick were well stratified throughout. Bedding composed of leaves and vegetable matter was found well preserved in the top of the sequence and layers of decomposed material of similar origin were noted at depth.

The cave is painted with the main painting that of a *Platanna* toad, possibly suggestive of a group totem. When first discovered, a whole pot was found on the floor of the cave and there were wooden pegs wedged in the walls. It is presumed these pegs were similar to those found in the floor of the cave as none in the collections are labelled as having been collected from the walls. Pottery was found on the surface and in the upper vegetation rich (bedding)

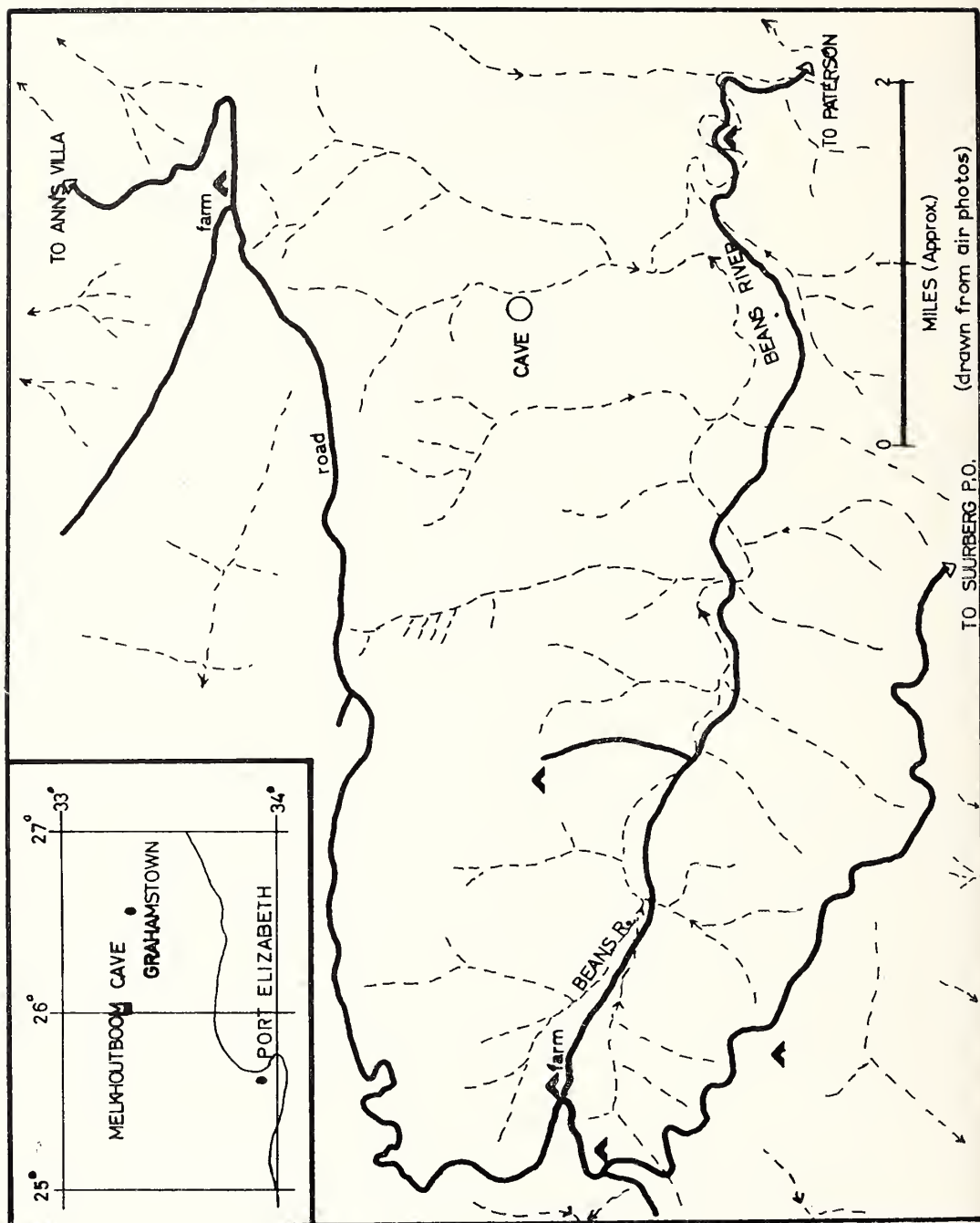


Fig. 1. Melkhoutboom Cave: Locality Map

layers. A few sherds were recorded at depths ranging down to 32 inches below surface. It appears the uppermost, cultural-stratigraphic pottery horizon is of variable thickness and the possibility that some sherds came from disturbed contexts such as pits cannot be ruled out. The pottery includes sherds of both grass and grit temper and can be broadly classified as Cape coastal pottery (type C2 of Rudner, 1968). A number of pieces of worked wood were found including pegs, a notched stick, wooden points, a fire stick and other informal tools. Cut reeds (*Cyperus textilis*) suggested to Hewitt the refuse from mat making. Included in the plant remains from the 1930-1 excavations was a reed (unidentified) burnt at one end with the other end notched to take a bow string—portion of a reed arrow. Two and four strand cord was found in the upper well preserved levels. Worked bone was rare but included a few bodkins. Ostrich egg-shell beads were found at all levels and ranged from 3.5–6 mm. in diameter. Other beads made on small estuarine shells (*Nassa* sp.) and discs of Turbo shell (one example edge notched and drilled, another example unpierced but retaining mastic on the back.) *Donax serra* (marine/estuarine) was found at all levels as was *Achatina* sp. (terrestrial) but *Unio caffer* was restricted to the top 22 inches of the deposit. The *Unio* shells do tend to fragment and are less readily identifiable, however apparent absence of *Unio* material in the pre-pottery layers is confirmed in the 1967 excavation samples and requires an archaeological explanation.

No attempt was made by Hewitt to record the full list of identifiable plants represented at the site although until recently the data given has been virtually the only source of archaeological information on plants of economic importance to the later Stone Age groups for any region in South Africa (*vide* Clark, 1959 p. 201). Further study has necessitated some revision of the identifications given in the 1931 report and made it possible to extend the list. Of the plants listed by Hewitt (*op. cit.*), *Babiana* sp. is represented by a single specimen. The mention of other Iridaceae may refer to the *Watsonia* sp., *Moraea* sp. and *Freezia* sp. while the common name, "Uintjie", would include *Cyperus usitatus*, all of which occur in the 1930-1 and 1967 collections. *Hypoxis* sp. is well represented in the samples from the site and occurs in quantities that suggest its use as a food plant. The Amaryllid material is referred to *Boophone* sp., a well known poisonous plant and the single specimen Hewitt identified as *Tulbaghia alliacea* is similar to but not identical with herbarium reference material. A fruit of *Encephalartos* sp. and seeds of *Cassine latifolia* are present in the 1930-1 collections. Notable omissions from the list are *Schotia afra* pods and *Pappea capensis* fruits.

The fauna listed by Hewitt includes crab, tortoise, antelope, dassie, leguaan, aardvark, porcupine, baboon and zebra (*Equus* sp.). The bone, as at other Later Stone Age sites in the region, is very fragmented as a result of human activities and not conditions of preservation. In the lower levels (pre-Wilton) of the deposit there is an apparent increase in the quantity of faunal remains and the observation of Hewitt (p. 545) that more large animals are represented in the lower levels is of possible ecological importance and requires further study.

The lithic cultural material was considered by Hewitt (*op. cit.* p. 543-8) to represent a Wilton assemblage. He noted the absence of any small formal Wilton tools from the lowest layer in the main or (ii) excavation (5' 6" – 7' 0" depth) where the sample was dominated by coarse quartzite flakes. However, as similar flakes occurred in all the overlying layers in association with typical Wilton tools, he interpreted the sample from the base of the sequence as a related variant of the Wilton reflecting simply a different mode of subsistence. Here perhaps undue weight has been given to the recurrence of rough quartzite flakes at all levels in the sequence and excavation control was not sufficiently precise to define the basal cultural horizon represented at the site. In the excavations (ii) and (iii), this basal horizon appears to be developed in the lower three feet of deposit and in excavation (i) where the stratigraphic control was least satisfactory, the equivalent deposit may be somewhat thinner. The possibility exists that the difference between the basal horizon and the overlying Wilton layers is more

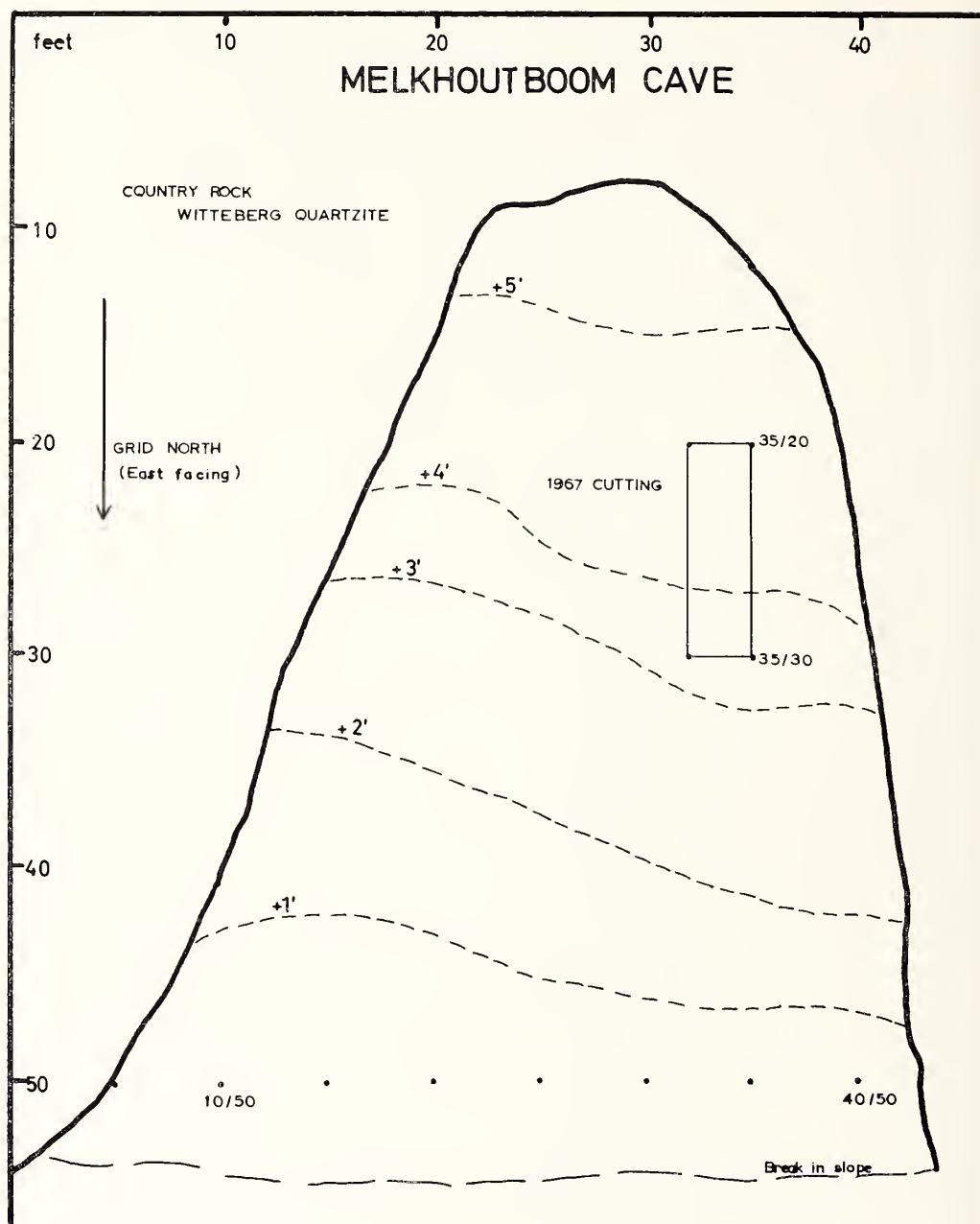


Fig. 2, Plan of Melkhoutboom Cave

important than Hewitt suggested and represents an ecological shift paralleling a cultural change.

The 1930-1 sample of cultural material from the upper part of the deposit includes a range of tools; scrapers (some with mastic), segments, backed blades and flakes, borers, adzes, pieces of palette, rubbing stones, a grooved stone and a bored stone, that would be expected from a Wilton assemblage in the eastern Cape.

The human skeletal material from a burial, apparently much disturbed, in cutting (i) includes the remains of an adult and a juvenile. This burial was in the top 20" of deposit and thus is within the Wilton levels. Gravestones covered the burials. No description of the very fragmentary and incomplete remains has been undertaken.

THE 1967 EXCAVATION

There are no existing plans showing the location of the three 1930-1 cuttings although their approximate location is indicated in Hewitt's report. However it was impossible to locate the 1967 cutting in relation to any of these. Fig. 2 shows the position of the latter cutting and it probably parallels the main or (ii) cutting, made in 1930-1. The 1967 cutting was ten feet long by three feet wide and was reduced to six feet long at a depth of about one and a half feet representing the base of the well-preserved plant remains. In this section of the cave the deposits are six feet deep and well stratified throughout (Fig. 3).

The deposits consist of interdigitating organic rich layers and lenses of white ash. The cutting in the upper levels followed the margin of a one foot thick multiple layered accumulation of plant material. In depth the plant material can be traced through an intermediate zone in which plant remains are still recognizable from relict textures but not readily identifiable and below a depth of about three feet, brown earth marks the originally organic rich layers. In localized patches, proximity to hearths had resulted in the carbonization of the plant material and the original high plant content of the brown earth layers can be deduced from these occurrences of carbonized stems and other fragments. It is apparent that during the whole period of accumulation of the deposits, introduced plant materials were a major constituent. Although the latter point may be assumed at many similar cave sites, it is demonstrably so in this instance. The preservation of plant materials in the top layers of the deposit is essentially due to the dry micro-environment of the cave. The Witteberg quartzite country rock is relatively impervious and the top layers being uncompacted allow some air circulation. The break-down of plant materials in the lower levels suggests these levels are less dry and some seepage through minor fractures in the folded country rock is evident. A poorly developed, discontinuous, thin, carbonate rich, cemented layer has developed within the sequence at some three feet above bedrock indicating a measure of leaching on the lower part of the deposit and the rise of moisture by capillarity.

The deposits appear to form a continuous series and no disconformities were noted. The character of the deposition is uniform throughout the sequence. The large number of units of deposition it is possible to recognize, afford a fine stratigraphic control for excavation, however it has been found necessary to combine the finds from a number of depositional units for considerations of sample size in the analysis of the cultural material from the 1967 cutting.

In this report three divisions are recognized in the deposit and these are cultural stratigraphic divisions although not of the same order. The upper division (15 cm.; 6") is distinguished primarily on the basis of the occurrence of pottery. The introduction of pottery is considered to be a significant event in the cultural history of the region, not specifically in the technological sense but rather in the wider social interactions it indicates. There is a cultural continuity in the upper and middle divisions and they are expressions of the Wilton culture.

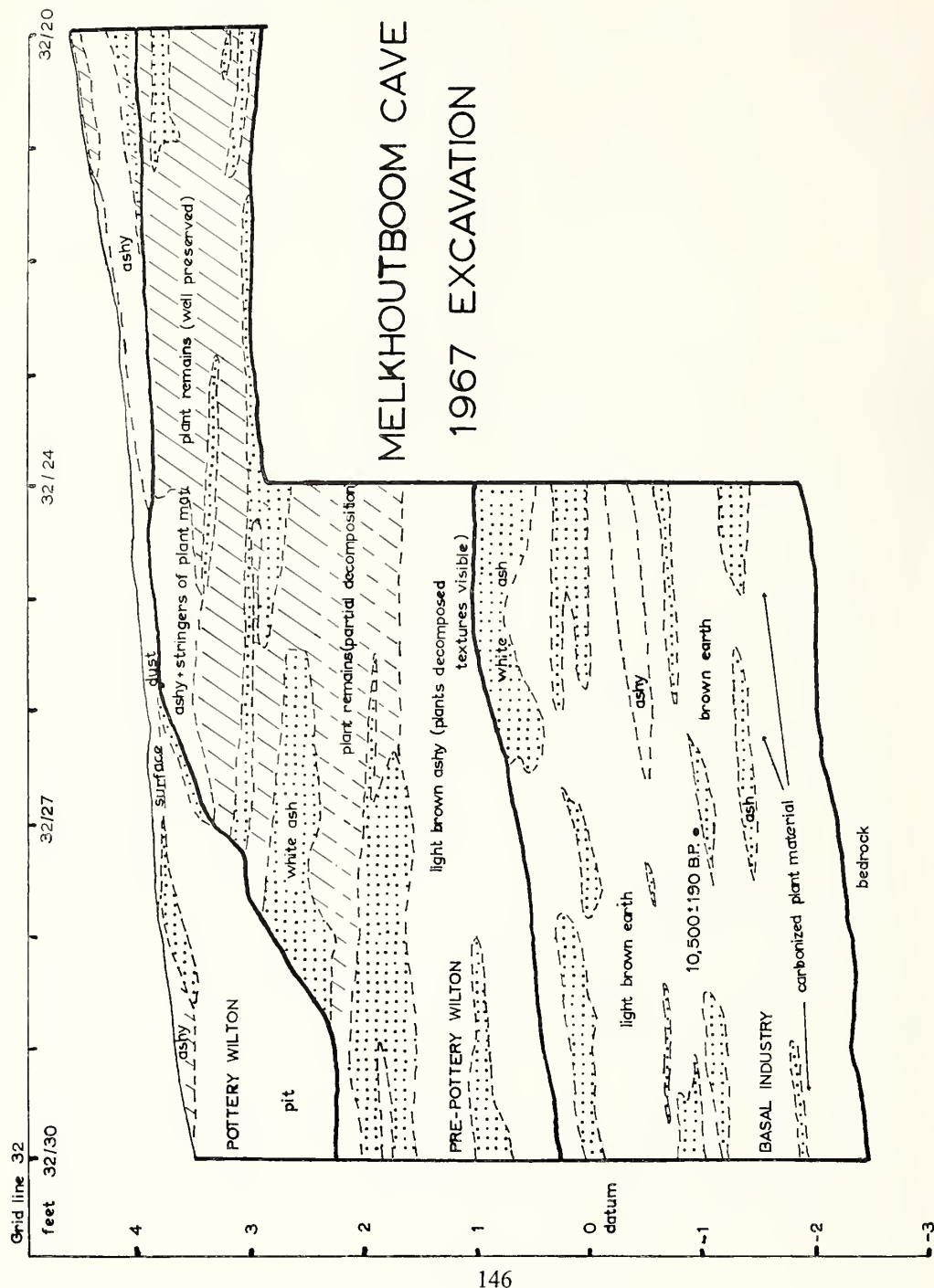


Fig. 3. Melkhoutboom Cave: Simplified section through the deposits

DEACON: MELKHOUTBOOM CAVE

Basal Industry				Pre-Pottery Wilton				Pottery Wilton				Cultural Units			
0	100	200	300	400	0	100	200	300	400	0	100	200	300	400	Frequency
		150						1495					257		Chunks
7					23										Cores
4					41					8					Core reduced pieces
					36					5					Pieces esquillees
					22					9					Outils ecaillees
		234						3692					328		Chips
			1514					8543					931		Untrimmed flakes
61							223			58					Trimmed flakes
					7										Trimmed flakes with mastic
					20										Snapped flakes with mastic
								3%		36					Small scrapers (incl. broken tools)
					3										Large scrapers
					15					3					Segments
					9					4					Backed blades & flakes
					8										Broken backed pieces / tools
					4										Borers
					1					5					Adzes
2															Anvils
					2										Rubbers
2					2					2					Edge ground stone & ochre
2					21					5					Misc. retouched pieces
					26										Broken tools

Fig. 4.

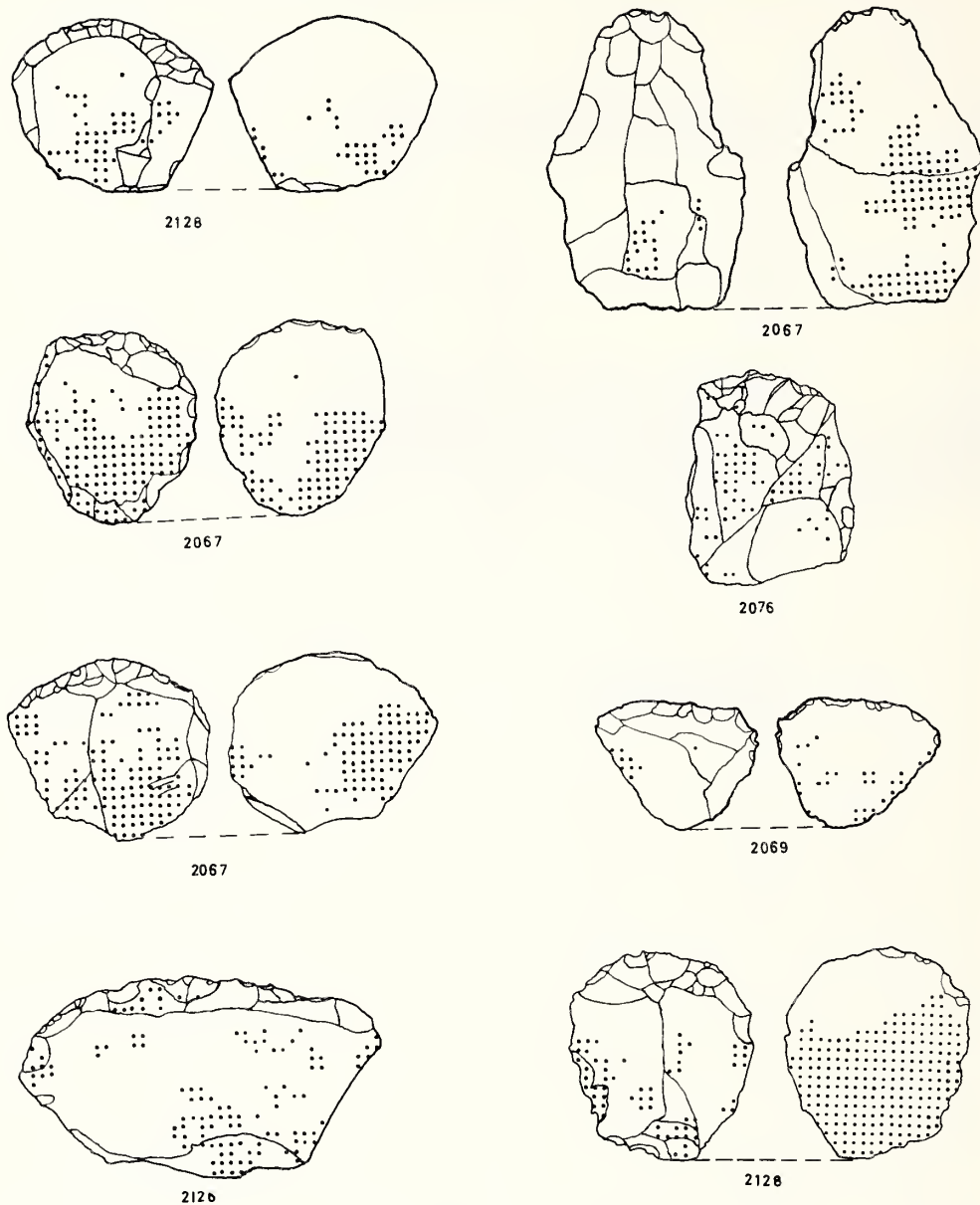


FIG.5

0 10mm. 20

1930-1 Convex scrapers :: mastic

For convenience in this report they have been designated the pottery and pre-pottery Wilton respectively. A specific typological and temporal correlation with the occupation deposits in layers 1-3 at the Wilton shelter is implied by the use of the term Wilton here. The basal division (1 metre; 3') has been provisionally termed the pre-Wilton horizon here. This cultural horizon for which a single date is at present available (GaK. 1538: $10,500 \pm 190$ yrs. B.P.) may correlate with layer 4 at the Wilton shelter and similar pre-Wilton samples from the cave sites of Welcome Woods and Uniondale, unpublished sites in the Albany District.

CULTURAL MATERIAL

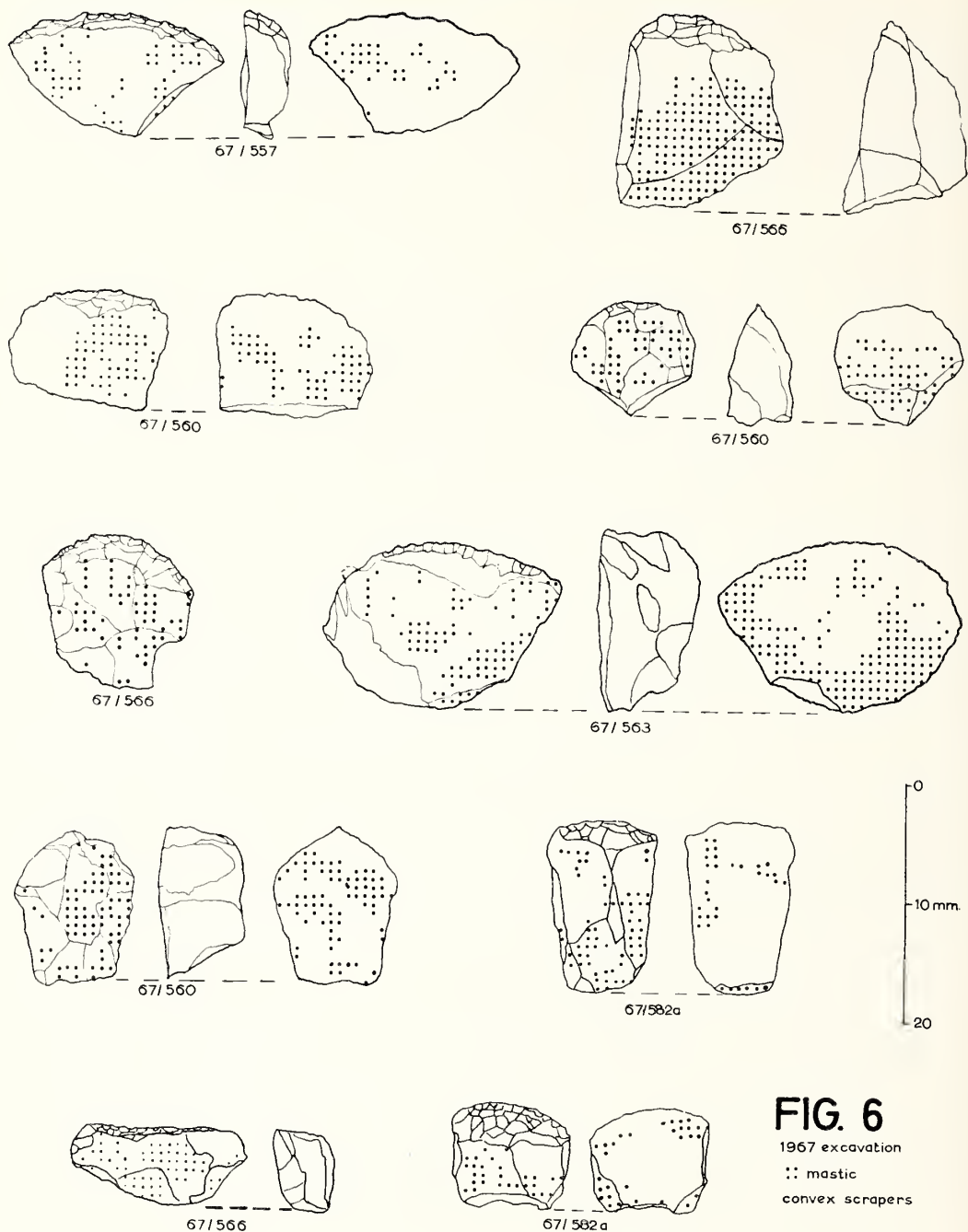
NON-LITHIC MATERIAL

In spite of favourable conditions for preservation, the finds of non-lithic cultural material were limited to a range of wooden tools, cordage and netting, beads in marine shell and ostrich egg-shell and pottery. Although represented in the 1930-1 sample no worked leather was found. A single bone awl (74 mm. in length) is the only evidence of bone working.

The only formal wooden tools found were pegs. In several instances these were found vertical in the deposit and no doubt in primary context. Two such pegs were associated with grass stems perhaps binding material. In function the pegs appear to be related to areas of bedding. A large number of wood slivers in the upper layers from 20-70 mm. in length and 5-15 mm. in width are good evidence of woodworking at the site as are the variety of cut and rough shaped pieces of wood. The woodworking is at a basic level, sections of twigs and branches have been cut by a ring and snap method and the shaping done by notching to produce a curl and the tearing off of a sliver. Fire and/or scraping has been used to finish off several of the pegs.

The material used in the manufacture of netting and cordage is *Cyperus textilis*. The use of this plant for similar purposes is known at Scott's Cave (Wells, 1965) and the cave on Windhoek Farm near Bredasdorp (Grobellaar and Goodwin, 1952). A small section (50 mm. long) of a net from the pre-pottery Wilton levels found in an accumulation of plant material is of some interest. The netting is 10 mm. mesh and made on fine two strand cord (1.8 mm. thickness) and knotted with the standard non-slip netting knot (Plate 5). Several detached knots were also found and these in themselves can probably be used as evidence of net making. Similar knots were found at Scott's Cave (Wells 1965, Fig. 4). It is possible that such fine meshed nets were used in collecting activities. No sections of matting were found. Cut, short lengths of *Cyperus textilis* (approx. 45-80 mm.) were interpreted by Hewitt (*op. cit.* p. 547) as possible refuse from mat making but could as easily be lengths for use in making cord. Direct evidence in the form of restricted ends of length of this fibrous plant as found at Scott's Cave is lacking (Wells, 1965). Short sections of *Phragmites communis* are common in the well preserved plant rich layers although there is no indication of the purpose for which this plant was introduced into the cave. A possible use is for arrow shafts but the single example from the site is of an as yet unidentified reed.

The occurrence of shell in the deposit although in minor quantities is of interest because as at other sites in the Albany District marine shells are well represented. Ostrich egg-shell, *Donax serra* (marine or estuarine sand mussel) and *Achatina* sp. (land snail) occur throughout the sequence. *Unio caffer* (fresh water mussel) as noted by Hewitt is of more restricted occurrence and was only recorded from the pottery Wilton levels in this excavation. Ostrich egg-shell beads were found at all levels and the less common marine shell used as a bead (*Nassa* sp.) in the pre-Wilton and pre-pottery Wilton levels. Sampling factors probably account for the absence of *Nassa* sp. beads in the upper division but the restricted occurrence of *Unio caffer* may be of archaeological significance. A single incomplete marine shell pendant and a piece of decorated ostrich egg-shell were the only other shell finds of note.



The shell imports may represent material brought into the site for food stuffs, raw materials for bead manufacture and for use as containers. Further some land snail material may represent chance inclusions. The *Achatina* and *Unio* shell are most likely food remains. The ostrich egg-shell is ubiquitous at all Later Stone Age sites and provides the main raw material for beads. Ostrich eggs may also have been brought in as food and the shells used as containers. The fragment of decorated shell is most likely from a container. The form of the decoration is an incised design. The consistent occurrence of *Donax serra* in the deposits is a feature of this and other Later Stone Age sites in the region. A few pieces of *Donax serra* show worked out central portions of shell and the majority of remains are smaller broken sections. Although the bulk of the small flat circular beads are ostrich egg-shell, a proportion are made in a coarser crystalline shell that matches *Donax serra*. The latter beads may take a higher polish than those made on ostrich egg-shell but are indistinguishable on other macroscopic features. The *Donax serra* shells are unlikely to represent food waste and that they have been imported exclusively as material for bead making is very probable. The incidence of marine shell in this inland cave is some measure of contact between this inland site and the coast. The nearest point on the coast is some 35 miles distant in a straight line. The well established pattern of the occurrence of marine shell in caves and rock shelters in the Cape Folded Belt probably reflects movements of groups across the coastal plain rather than any formalised trade on the present evidence.

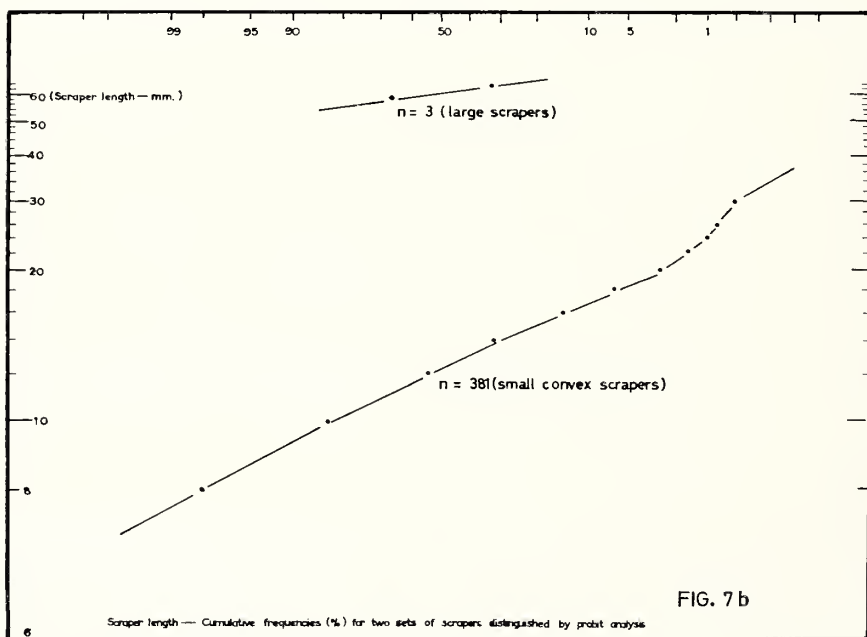
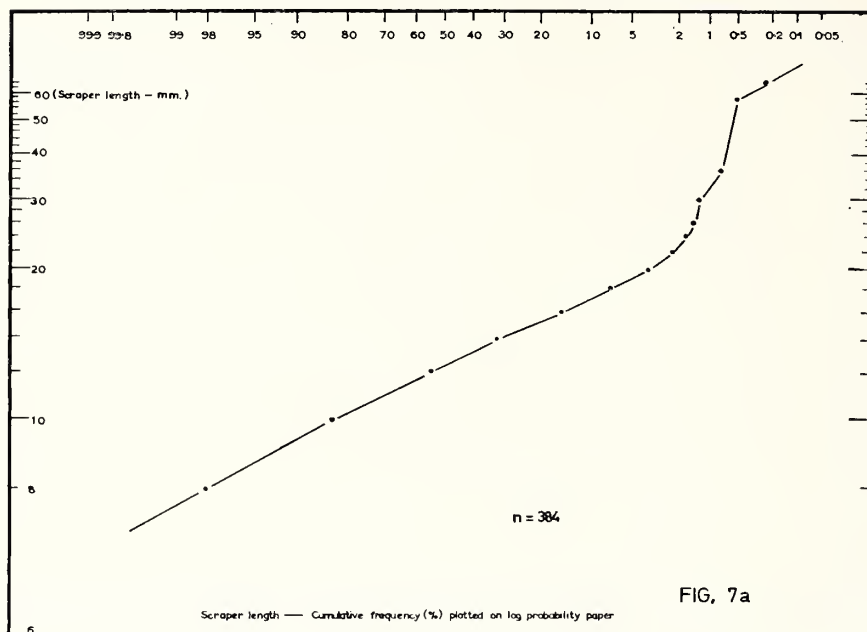
Tabled below is the occurrence of shell fragments (excluding worked shell) in the excavated unit samples in the three divisions of the deposit. Shell occurs in a lower proportion of samples in the pre-Wilton levels than in the overlying divisions. In all three divisions *Donax serra*, ostrich egg-shell and *Achatina* sp. each occur in more than half the samples that include shell. Again, the table shows the restricted occurrence of *Unio caffer*.

	Pre-Wilton	Pre-pottery Wilton	Pottery Wilton
No of excavated unit samples	30	40	14
No. of samples with shell	17	38	14
No. of samples with Ostrich egg-shell	15	34	8
No. of samples with <i>Donax serra</i>	12	36	8
No. of samples with <i>Achatina</i> sp.	14	32	11
No. of samples with <i>Unio caffer</i>	—	—	11

The decorated pottery sherds are illustrated in Figs. 13 and 14. By definition the pottery is restricted to the upper division in the deposit. The development of the pottery horizon is limited in this cutting and apparently in the site as a whole. An internally reinforced lug was found in the deposit but is not illustrated.

LITHIC CULTURAL MATERIAL

The frequencies of artefacts in the typological scheme adopted in this paper are given in Fig. 4. The object of the classification is in the first instance descriptive rather than analytical. It is a classification from above with the object of delimiting on a few characters, broad classes which where appropriate can be further studied by multivariate techniques (classification from within).



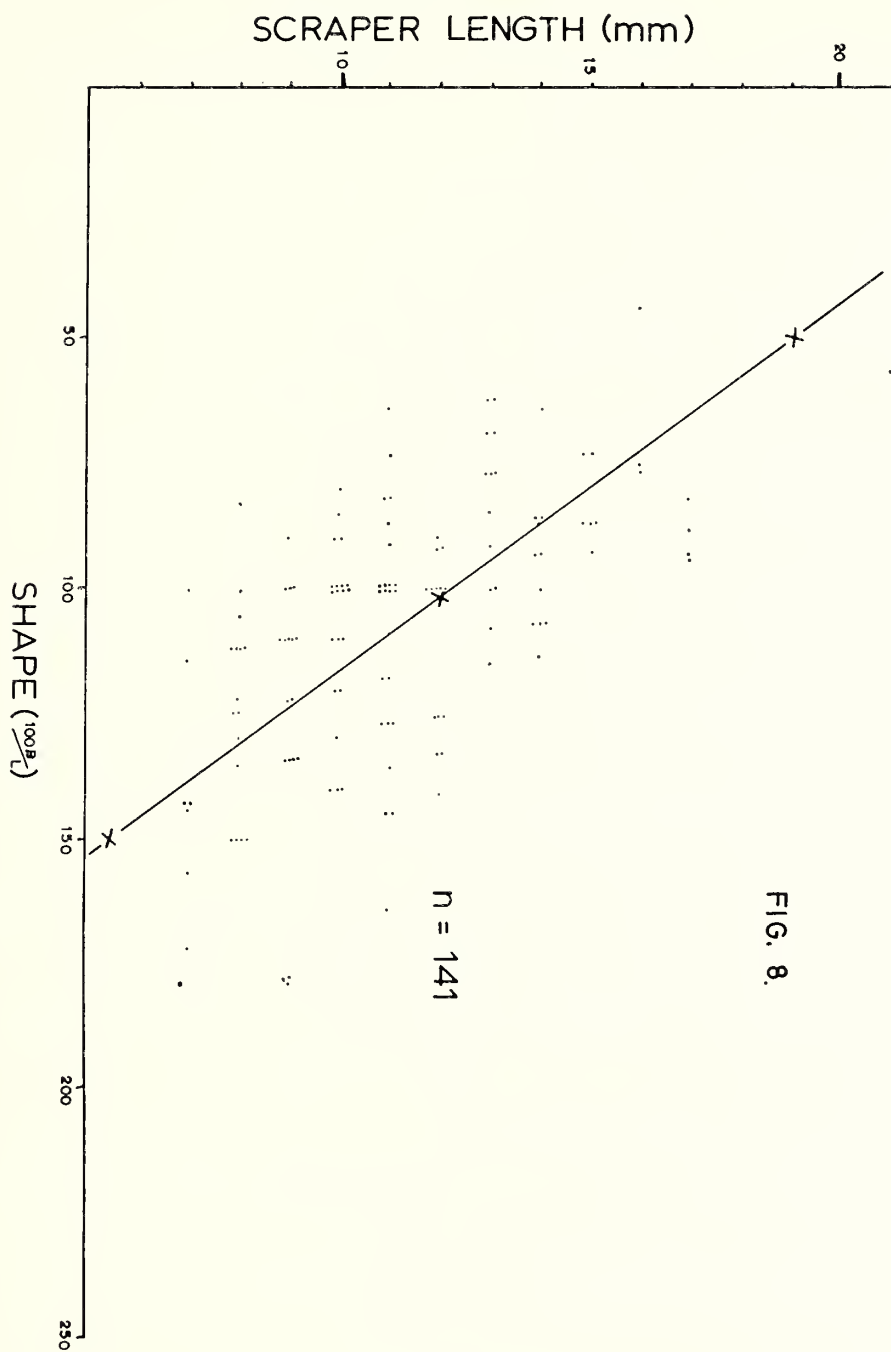
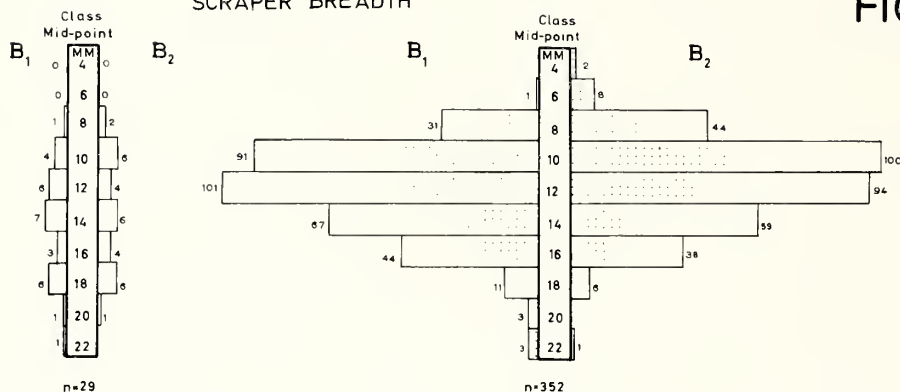


FIG. 8.

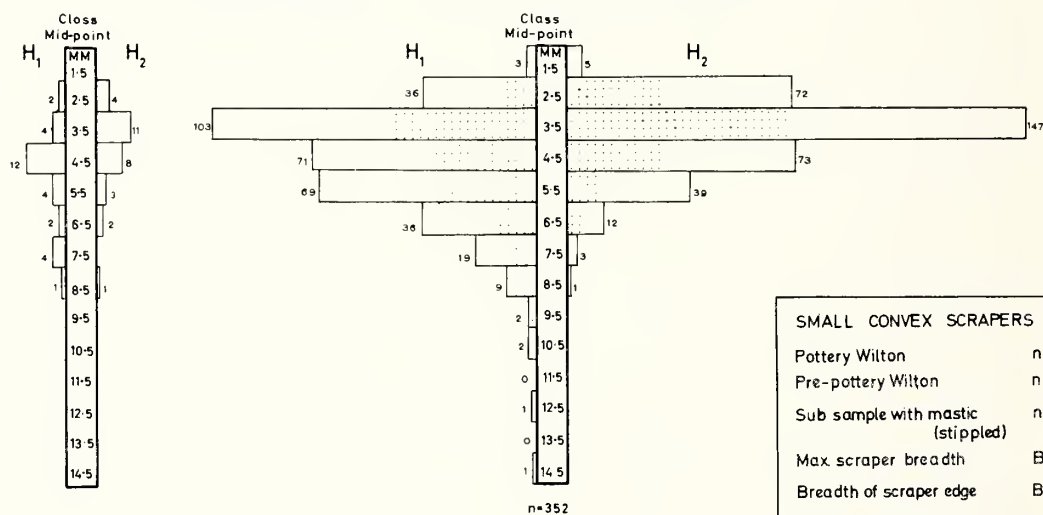
SCRAPER BREADTH

FIG.9



SCRAPER HEIGHT

Correlation Coefficient (B₁B₂, n=141) r=0.91



Correlation Coefficient (H₁H₂, n=141) r=0.17

SMALL CONVEX SCRAPERS

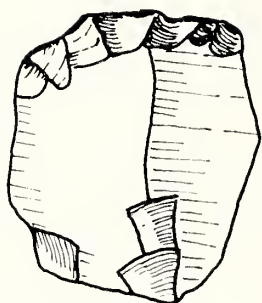
Pottery Wilton	n = 29
Pre-pottery Wilton	n = 352
Sub sample with mastic (stippled)	n = 141
Max. scraper breadth	B ₁
Breadth of scraper edge	B ₂
Max. height of scraper	H ₁
Height of scraper retouch	H ₂

The terms used in the typological scheme follow current usage in general. However, the following comments are made by way of amplification. Chunks are larger artefact waste predominantly of non-flake origin and graded on a size basis as greater than 10 mm. in maximum dimension. Cores are pieces which show a pattern of flaking consistent with the systematic production of flakes. What are termed core reduced pieces here are a sub-class of cores representing worked out micro-blade cores. Two terms have been used to describe artefacts with similar heavy edge damage, they are pieces esquillées and outils écaillées following Tixier 1967. These artefacts share some attributes with the core class (*vide* Clark, 1958; Gabel, 1965) and obviously no clear distinction can be drawn in all cases. The apparent absence of mastic in the sample of outils écaillées studied from the site is of interest, but not conclusive that these artefacts were not mounted. Chips include small waste predominantly of flake origin less than 10 mm. in maximum dimension. Both flake fragments and small trimming flakes have been classified as chips. The untrimmed flakes are flakes with no visible damage on the laterals that could be ascribed to usage or trimming (shaping or sharpening). Trimmed flakes on the other hand show one or other of the characters.

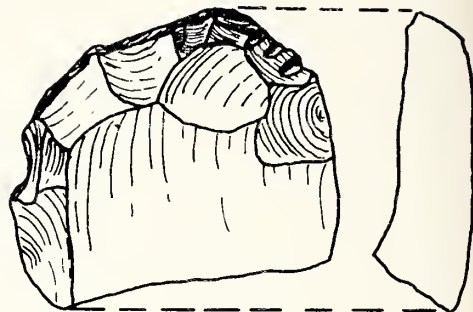
The convex scrapers all show a regular curved working edge, steeply retouched, and thus the class limits can be defined in practice with a high degree of reliability. The scrapers are discussed further elsewhere in this report. The frequency of backed tools is low. The segments (crescents) show regular backing along the thicker arc and the general usage of the term is followed. It has been convenient in other samples from this region to draw a distinction between backed blades and flakes based on the blank form (e.g. Wilton) although none is made here. Borers are small tools with steep lateral retouch (Fig. 11). Adzes are a typical element in all Wilton samples examined although the frequency is low. They may be made on a flake or chunk and show deep, medium to steep step flaking usually along one margin only (Fig. 11). Striations presumably from use have been observed on several adzes made in shaly material. Adzes are the only tools made in this material although examples in silcrete and quartzite are as common. Rubbers show one or more polished grinding surfaces.

The frequency of formal tools in the Wilton samples studied thus far from the eastern Cape, is variable and low with the exception of the convex scrapers. In 1967 Melkhoutboom sample, this feature is very apparent. The bar charts show the similar range of tools in the pottery and pre-pottery Wilton and the paucity of formal tools in the pre-Wilton or basal industry. The increased use of quartzite in the basal levels of the site is another important difference and is indicated in Fig. 12. The raw or untrimmed flakes represent an acceptable unbiased sample of the flake production at different levels or time periods and there is a marked decrease in quartzite and increase in quartz and chalcedony in the Wilton levels relative to the basal industry. It is noteworthy that quartz and chalcedony were selected for in the making of convex scrapers and other formal tools that characterise the Wilton levels and that are absent in the basal or pre-Wilton sample. The importance of quartz and chalcedony as raw materials at this site while reflecting local available raw materials does contrast with Wilton sites east of the Zuurberg including Wilton itself, where silcrete was extensively used.

The convex scrapers warrant discussion as the most important typological class from the aspect of potential for further analysis. Again the sample available for study includes a large series of scrapers retaining mounting mastic and gives useful direct evidence of hafting. It has been of convenience to recognize a class of large scrapers as distinct from main sample of small convex scrapers. The decision on what to call a large scraper was made with reference to the cumulative curve for the parameter scraper length plotted on log probability paper (Fig. 7A). The large scrapers (Fig. 10) might be considered simply as the tail of a length frequency distribution or possibly as the reoccurrence of earlier forms as similar scrapers occur in the pre-Wilton at Weleome Woods for example. The frequency is low (3 in a total of

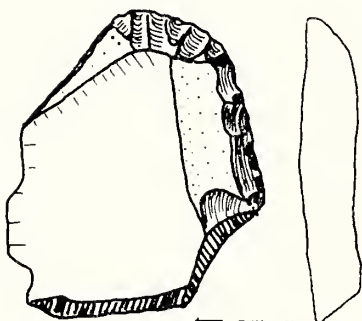


2117
(1930-1 iii at 5')

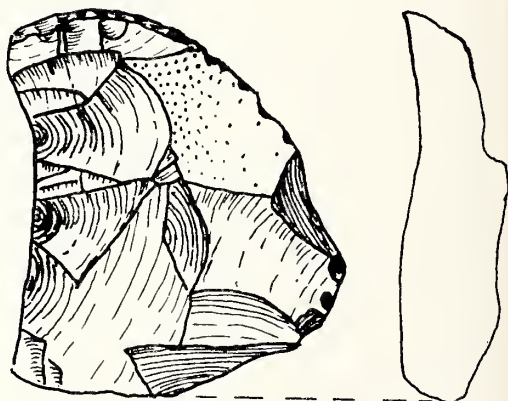


2116
(1930-1 ii at 5' 6")

Large Scrapers



67/591



67/595

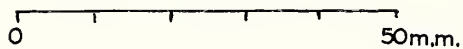


FIG.10

374) and these tools would be excluded from the main scraper sample on attributes other than length.

Better than 98 per cent of the scraper sample is then classified as small convex scrapers. Of 374 scrapers from the pre-pottery Wilton 352 were unbroken for the purpose of measurement and of these some 141 or 40 per cent retained traces of mastic. Of 29 complete scrapers in the pottery Wilton sample, 9 showed mastic. Factors of detection (by microscopic examination) and preservation (poorer in ashy layers) may be invoked to explain the lower percentage of small convex scrapers with mastic and the hypothesis can be set up that these tools were invariably mounted. The testing of this hypothesis rests on demonstrating that the mastic and non-mastic examples form part of a single population. That this is so is suggested by the example given below of a test on the length of scrapers in the pre-pottery Wilton sample.

Variate	211 small convex scrapers without mastic \bar{x} (Geometric mean) s^2		141 small convex scrapers with mastic \bar{x} (Geometric mean) s^2		t P		t test
Length of scraper	11.53	8.6048	11.40	0.2219	0.52	.6	Not significant

Although to accept the hypothesis more adequate testing would be desirable the archaeological inference based on 40 per cent of the scraper sample, that these tools represent detachable and expendable bits of composite tools has some meaning. As yet no complete composite tool has been found at the site and the preferred orientation of the mounted bit in holder is not known. Examples of hafted tools from the Plettenberg Bay area suggest two possible orientations and also give evidence of the mode of mounting such tools unattached to the handle in a mass of mastic (Deacon, 1966). It must be assumed that the mounting medium retained the property of being reworked possibly by heating in order to account for the absence of tool holders in a context where preservation could be expected. The only mass of mastic recovered from the 1967 excavation was a flattened lump in the centre on a thin unworked twig. This is most likely to represent a mode of keeping a supply of mastic available for various uses.

In Figs. 5 and 6 a series of small convex scrapers from the 1930-1 and 1967 excavations are illustrated. These illustrations show the extent to which the tool was buried in the mastic and the variation in tool blank form. The method of hafting postulated allows for considerable variation in blank form and only a limited part of the tool protrudes from the mountant. The distance from the mastic to the working edge of the tools ranges from 1 to 7 mm. with the highest frequencies estimated between 2 and 4 mm. Because the retention of mastic over the surface of a tool is usually patchy this distance can only be an estimate.

Some quantitative attributes of the convex scrapers are given in Figs. 7, 8 and 9. In addition for this sample other attributes such as raw material, convexity of scraper edge retouch position and plan form have been recorded. In this report, however, the attributes are not considered other than as single variables. Any discussion of types within this class must depend on further analysis. The regularity of the scraper retouched edge and information on hafting provided by the traces of mastic makes it logical to define the dimensions of these tools relative to the scraper retouched edge. Thus length is defined here as the distance from the centre of the convex scraper edge to the butt of the tool. While there is considerable variability in blank form, the size is small with mean breadth and length of the order of 12 mm.

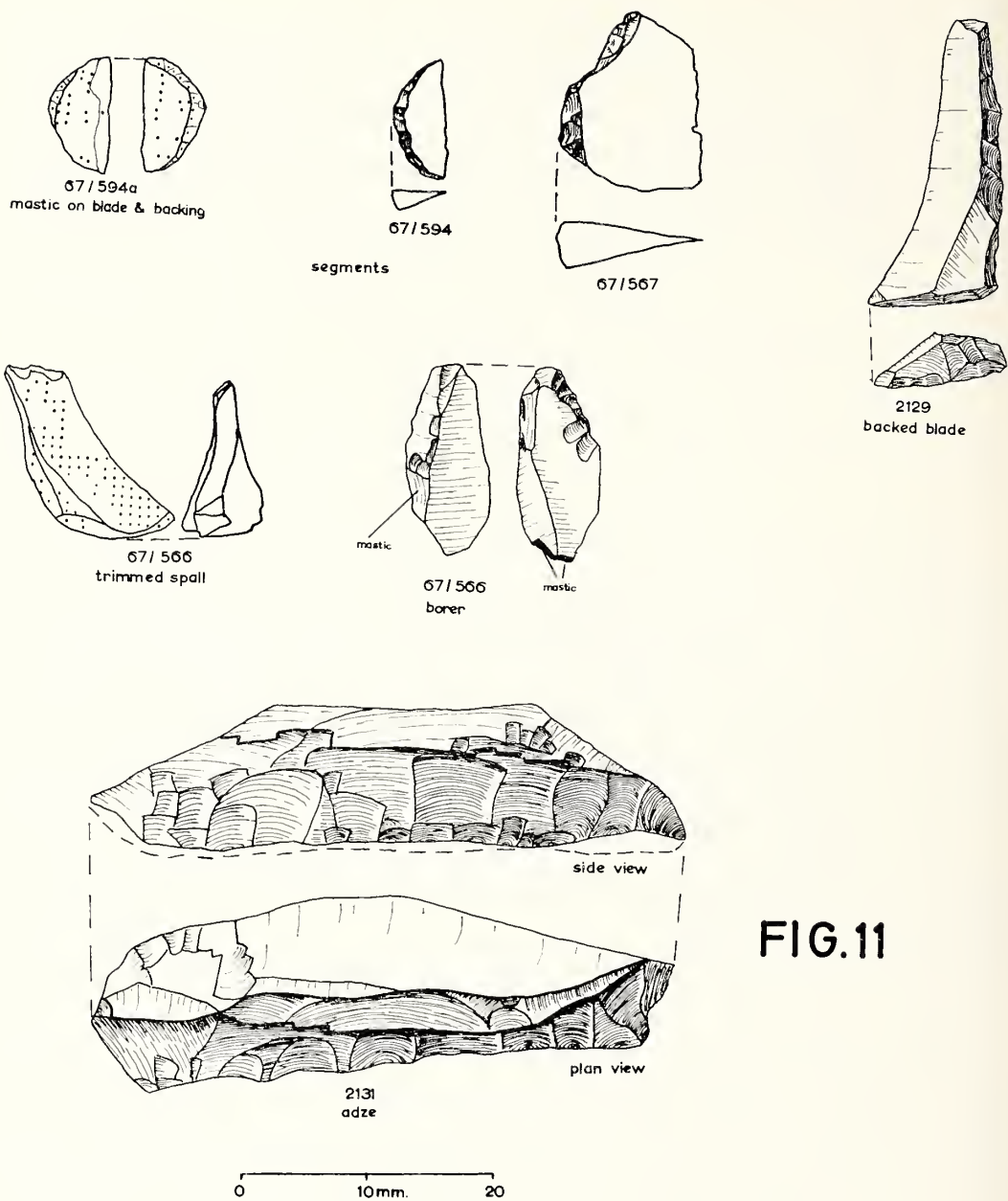


FIG.11

The frequency distribution for tool height shows a J-shaped distribution and no high backed type is apparent. The height of retouch (the height of scars shaping the convex scraper edge as opposed to the shorter undercutting re-sharpening scars) shows a low correlation (probably spurious) with tool height (Fig. 9). The norm for the height of retouch appears to lie between 2 and 4 mm. The majority of scrapers have divergent or parallel laterals and there are few asymmetrical and nosed examples. This is brought out by the high correlation between the maximum breadth of the tool and the breadth at the scraper retouched end, B_1 and B_2 of Fig. 9. Possibly because of the consistently small size of the tools, there has been very limited shaping of the tool blanks. This reduces possible confusion between scraper retouch and steep retouch shaping the tool. A number of intuitively recognized types in the Wilton scraper sample appear to be absent from the Melkhoutboom material. It may be suggested that this is related to the use of silcrete at Wilton and this hypothesis warrants testing where inter-site correlation is being considered.

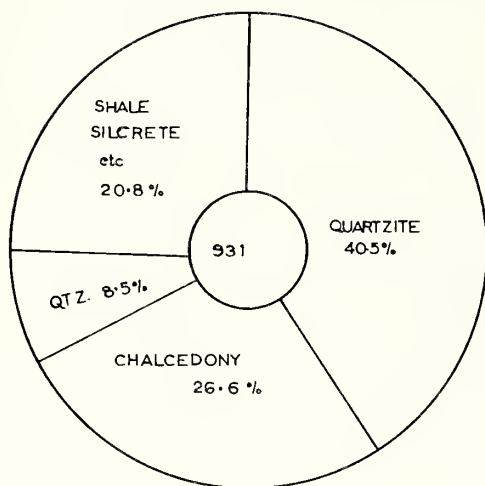
The frequency of formal tools other than the scrapers limits the information these contribute on the range of tools hafted. A single segment in this sample provides good evidence of hafting (Fig. 11). The mastic traces suggest the mounting of this tool with the full edge of the blade exposed. This does not support the generally held concept of the segments mounted as some form of projectile tip. A borer illustrated in Fig. 11, shows these tools were also hafted although further specimens are required to provide information on how deeply they were fixed in the mountant. Two adzes, one in the 1967 sample and a better example from the earlier excavation retain limited traces of mastic and it must be considered probable the adzes were hafted as well. It is evident from simple flakes retaining traces of mastic that not only the formal tools were hafted.

GENERAL DISCUSSION

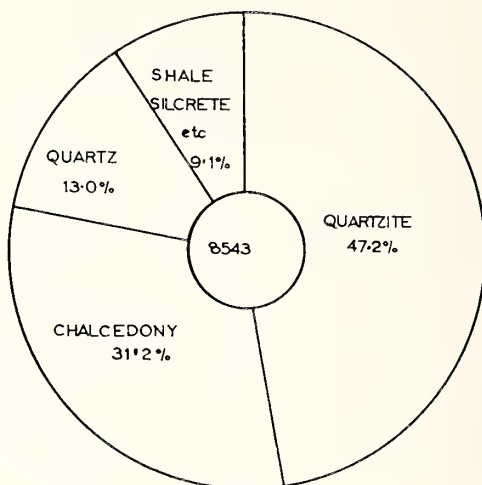
Melkhoutboom is one of a large number (probably several hundred) of caves and rock shelters in the eastern portion of the Cape Folded Belt. The majority of these examined show occupation by prehistoric groups of the Later Stone Age in the period equating broadly with the post-Pleistocene. The site cannot be considered in isolation and some general comments on the archaeology of the region are given below.

During the last fifty years some seventeen cave or shelter sites have been excavated although few have been published (Hewitt, 1920, 1921, 1925, 1926, 1931, 1932; Stapleton and Hewitt, 1927, 1928) and the records of the excavations are of varying value. A current programme of research into the post-Pleistocene prehistory of the region includes the study of these unpublished excavated samples, the re-excavation of selected sites and the excavation of new sites. Thus far the name sites of the Howieson's Poort and Wilton cultures have been re-excavated in addition to the work described here on Melkhoutboom Cave. Publication of both the Howieson's Poort and Wilton sites is in preparation (J. Deacon). The dating of the Howieson's Poort site ($I-1844:18,740 \pm 320$ yrs. B.P.) suggests this belongs to the terminal Pleistocene and although not of direct relevance to this discussion it is of interest to note recent work elsewhere, at Montagu Cave (Keller, 1969) and at unpublished sites on the south Cape coast and in the Cradock area which will contribute to a fuller definition of this culture or culture group than has been hitherto possible. It is not intended here to anticipate the results obtained in the now completed study of the 1967 excavated sample from Wilton and only brief mention is made of this site. However this discussion rests in part on data obtained from Wilton, from the unpublished earlier excavations of Uniondale, Welcome Woods and Governors Kop (all in the Albany District) and on the results of research in the Gamtoos Valley

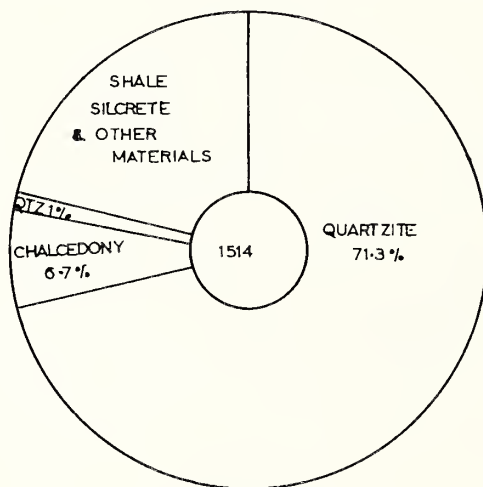
MELKHOUTBOOM '67 RAW FLAKES



POTTERY WILTON



PRE-POTTERY WILTON



BASAL INDUSTRY

FIG.12

DEACON: MELKHOUTBOOM CAVE

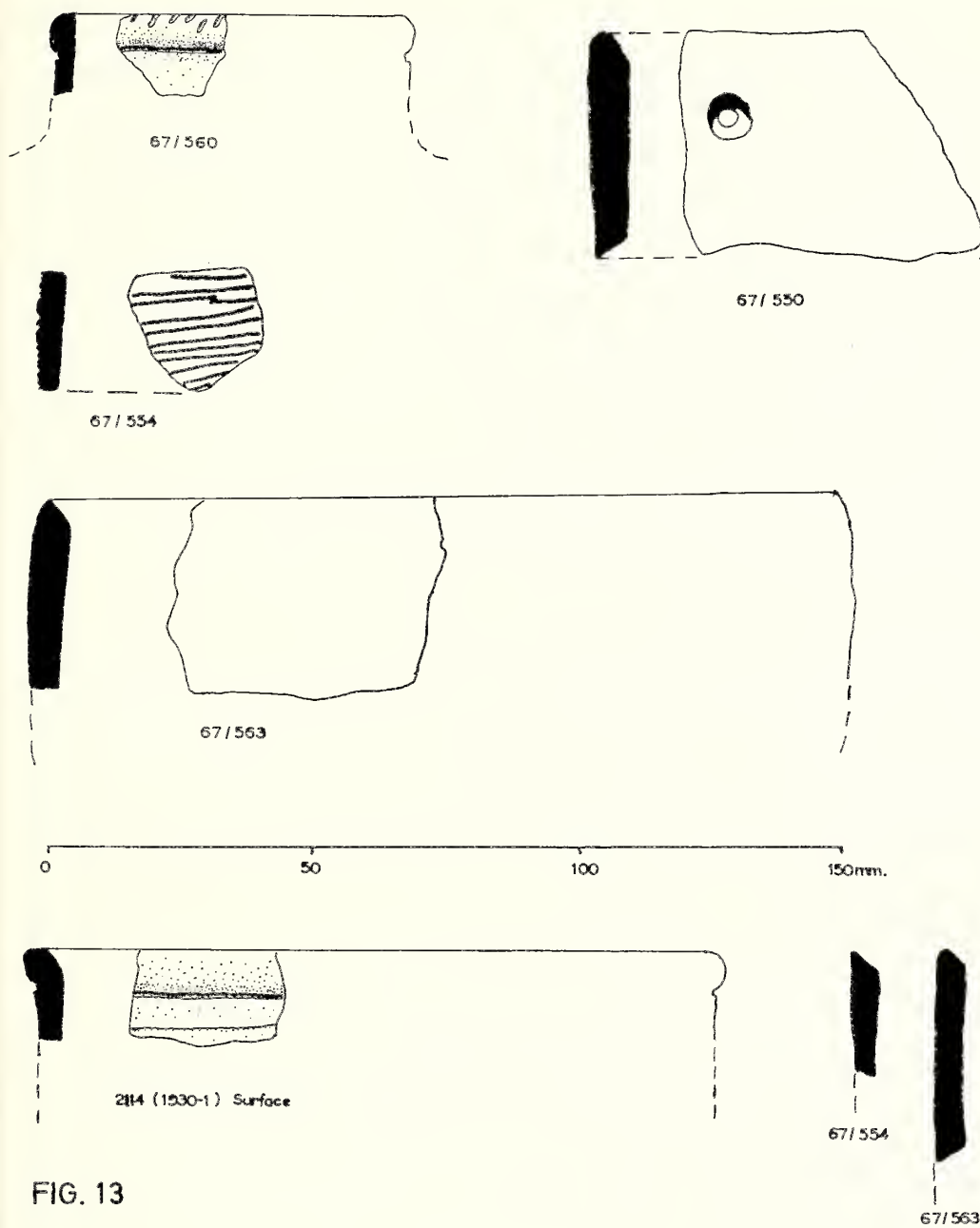


FIG. 13

(Deacon and Deacon, 1963, Wells, 1965, Deacon, J. 1966, Hendey and Singer, 1966; and Deacon, H. J., 1967).

As a blade industry that includes backed elements, the Howieson's Poort might have been expected to have been prominent in the ancestry of the Wilton culture however a pre-Wilton cultural entity at present unnamed interposes itself in the apparently linear sequence recognized in the eastern Cape region. The latter appears to occupy the early post-Pleistocene although only a single date is available for this stage at Melkhoutboom (Gak-1538; $10,500 \pm 190$ yrs. B.P.) As this industry is recognized at the base of the sequence at a number of the sites in the small series excavated, it may mark the initiation of intensive occupation of cave sites within the mountain belt. In this region where the majority of sites are located in Witteberg Quartzite the ephemeral nature of caves and rock shelters is probably not a major factor accounting for the absence of earlier occupation. There is the suggestion originally made by Hewitt but as yet unconfirmed that at Melkhoutboom an ecological difference between the pre-Wilton and Wilton phases of occupation may be reflected in the fauna. One might speculate that the Valley Bushveld ecological zone was more important to these groups than to the succeeding Wilton populations. There is direct evidence at Melkhoutboom in carbonized vegetation for the introduction of plant materials into the cave for bedding and presumably also as foodstuffs. Marine shell beads and fragments of *Donax* shell that occur throughout the pre-Wilton levels at Melkhoutboom point to the coastal niche being exploited. Although marine shell occurs less frequently than in the overlying Wilton levels, sampling and not relatively reduced coastal connections may be involved here.

The Melkhoutboom sample is inadequate for a typological description of the pre-Wilton cultural material. Correlation is however suggested with layer 4 at Wilton and the lower levels of the Welcome Woods sequence.

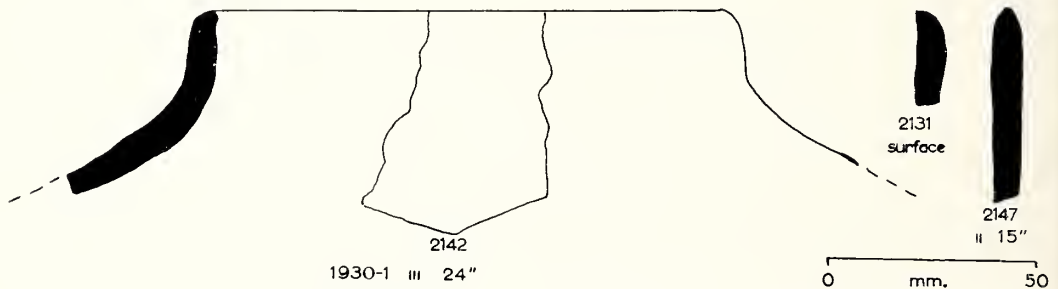


FIG. 14

Perhaps the most significant result of recent research has been the better understanding afforded of the Wilton culture. This is viewed as the product of a climax hunter-gatherer society that dominated the region during the last last five thousand and more years (two dates are available for the pre-pottery Wilton at the Wilton shelter, I-2565, 4860 ± 115 ; and Gak-1540, $2,270 \pm 100$ years B.P.; J. Deacon pers. comm.) and groups are known to have occupied niches in the mountain and coastal belts. The region being one of varied relief and with a very rich flora, a number of ecological zones would have been within the collecting range of most sites (Acocks, 1953; Martin, 1965). At Scott's Cave in the Gamtoos Valley, 220' a.s.l. and Melkhoutboom Cave in the Zuurberg, 2,500' a.s.l., in the well-preserved plant remains there is evidence of selection favouring plants with a wide distribution and seasonal availability.

Thus the different setting of these sites is scarcely reflected in the plants of economic importance. The faunal analysis of material from Andrieskraal in the Gamtoos Valley suggests an emphasis on non-migratory ground game and small antelope. (Hendey and Singer, 1965). Apart from the Valley Bushveld areas which even today at Addo supports large herbivore herds, the biomass of the region would have been low relative to the climax grassland region immediately inland. The Fynbos, Macchia, scrub and scree Forest mosaic of the mountain and coastal belts are typically the habitat of Bushpig, Grysbok, Blue Duiker and Bushbuck amongst the ungulates (Bigalke and Bateman, 1962). In the coastal belt, the sea shore provided a niche which oral tradition in the Onder Kouga area (Joubertina District) suggests was occupied for a limited time in an annual cycle. This may have provided the cultural system with the apparently necessary focus for regular congregation of large social units. Thus from what is known of the ecology the Wilton population appear to have been specialized hunter-gatherers adapted to the occupation of limited territories on a semi-permanent basis.

The oral tradition mentioned above records the movements of the last Bushman band in the Long Kloof and merits further explanation. The band occupied a series of three caves, one on the coast for some two months in summer, another in the Baviaanskloof in winter and a third, the location of which is known in a tributary valley of the Kouga River, during the remainder of the year. Open sites such as that known near the Bushman's River on the farm Carnarvondale (33° 30' S; 26° 7' E) may have provided an alternate focus of occupation to caves or shelters within the same pattern. Unfortunately deposits that have included plant remains have not been of much value in testing this pattern of seasonable movement because of the plant selection apparent. Possibly faunal studies would offer more scope in the study of this problem. Some pattern of movement between the coast and inland areas has generally been assumed although hitherto evidence even of the level of the tradition recorded here, has been lacking.

At present the areas immediately inland of the Cape Folded Belt in the eastern Cape are excluded from the culture area of the Wilton. Little research has been done in this region and although the edge of the Karroo Basin corresponds to an ecological boundary there is no direct evidence of the effectiveness of this boundary in terms of human ecology at any point in time during the post-Pleistocene. The ecological setting of the sites on the south Cape coast (Goodwin, 1938; Louw, 1960; Fagan, 1960, 1962; Schrire 1962) is very similar to that in the eastern Cape and there is a broad correspondence in dating and typology to the eastern Cape sequence. However we are far from the stage where the data is sufficient to apply objective measures of association with this group of sites or other groups further afield.

ACKNOWLEDGEMENTS

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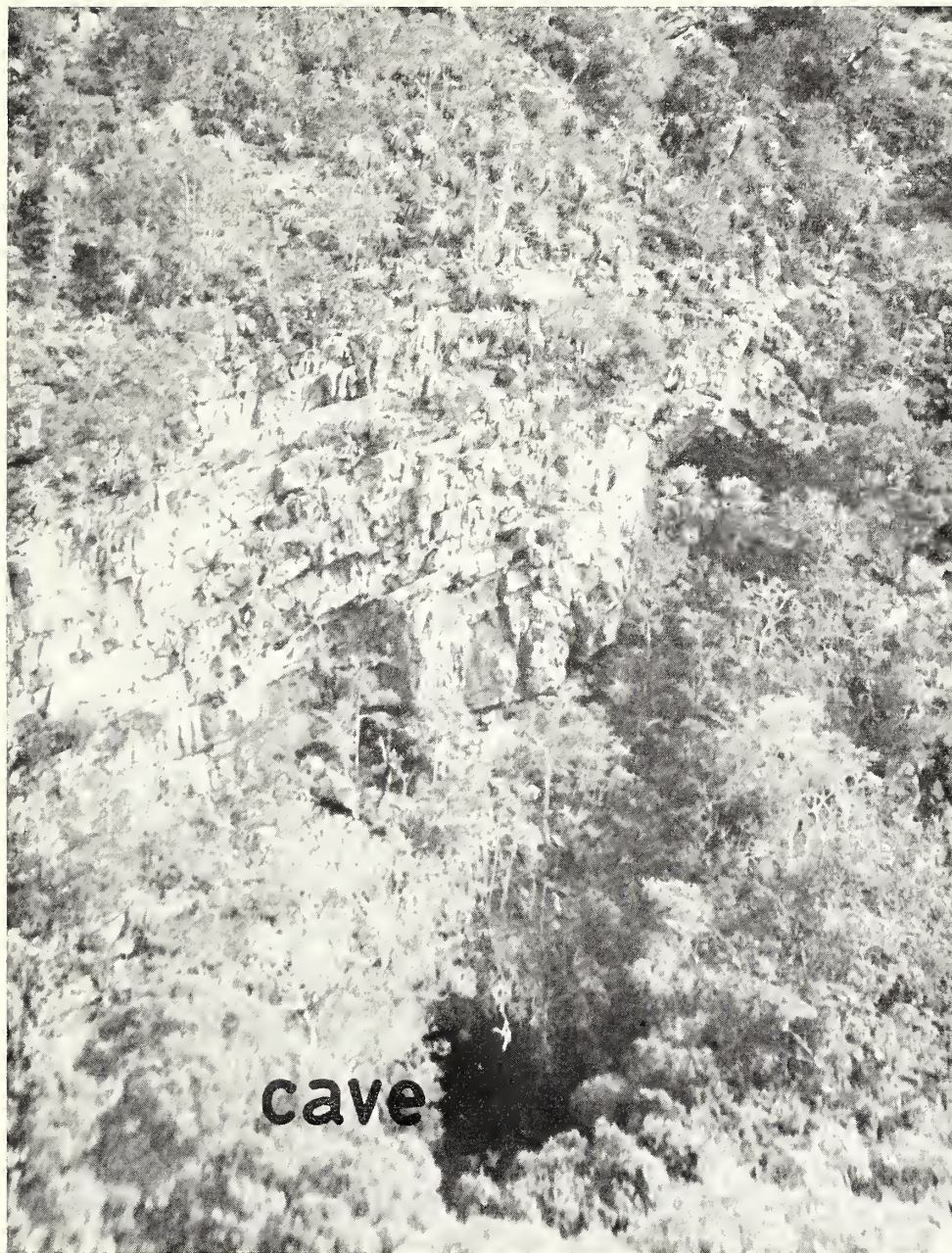


Plate 1: The setting of Melkhoutboom Cave is in a scree forest developed within a steep sided kloof. This cave and a smaller higher cave have been formed in the apex of a fold that can be seen in the Witteberg Quartzite krantz.

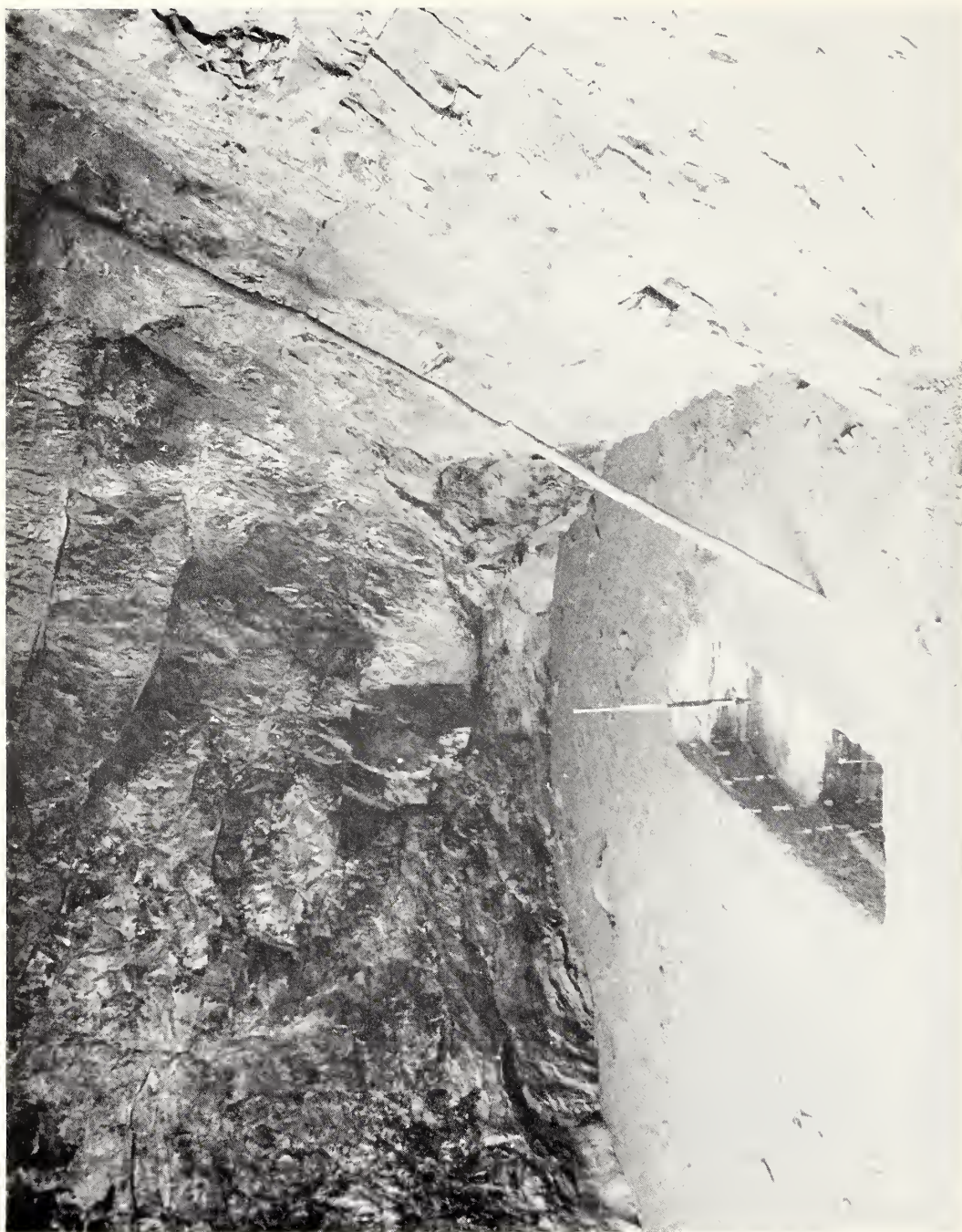


Plate 2: The interior of the cave showing the 1967 cutting. A pole ladder leads up to the paintings high on the wall. Scale in feet.



Plate 3: A section of the 1967 cutting shows the stratification of the deposit. The top of the ranging rod (feet) marks a layer in which relict textures of plant material are visible and well preserved plant remains occur above this layer. Some local disturbance of the deposit adjacent to the ranging rod is due to burrowing by small mammals.

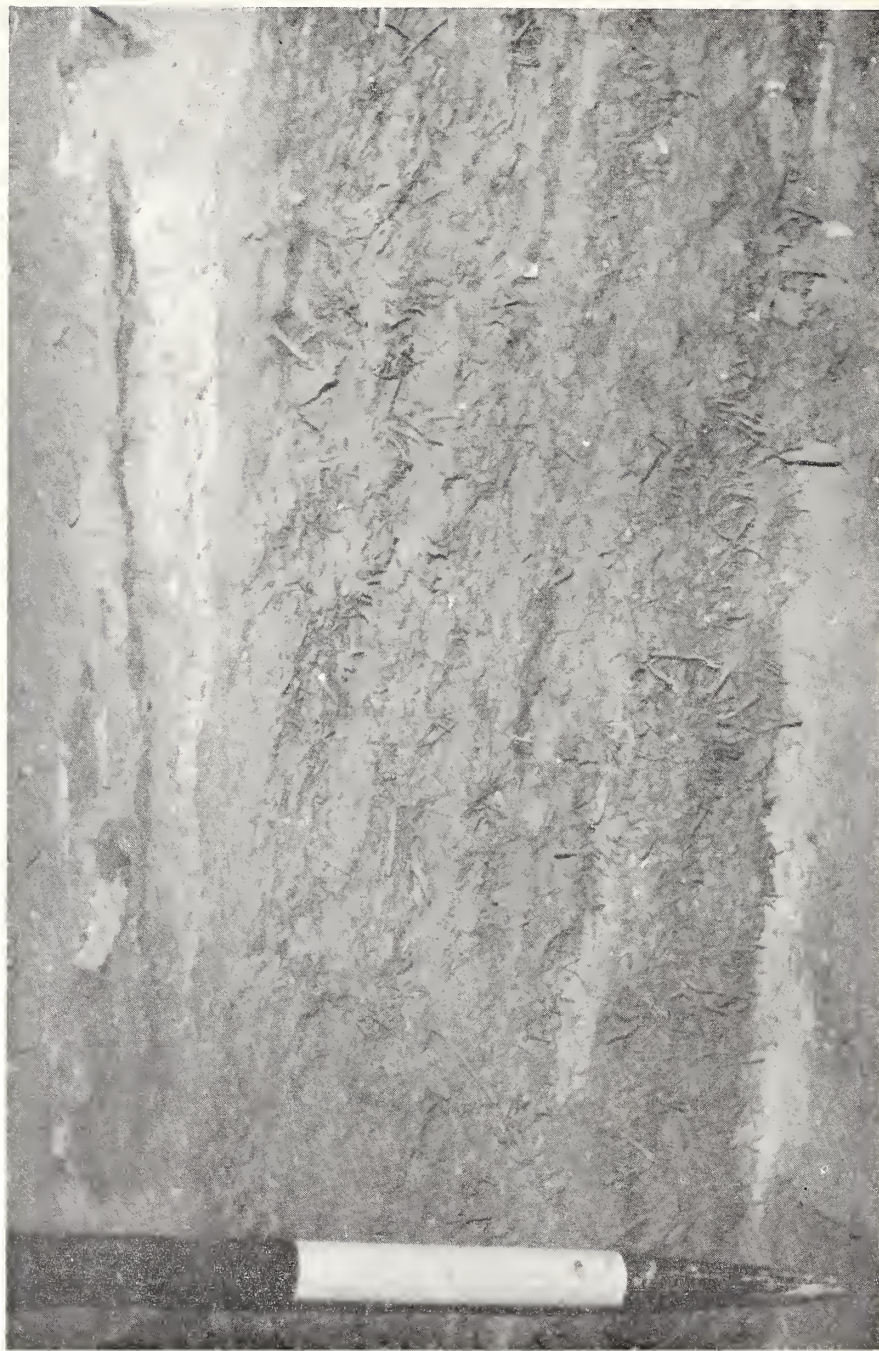


Plate 4: A section through a layered accumulation of plant remains, some 12" (30 cm.) thick can be seen below an ash lens that marks the top of the sequence here in the 1967 cutting.



Plate 5: Portion of a net made from *Cyperus textilis*.

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